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DEPARTMENTS

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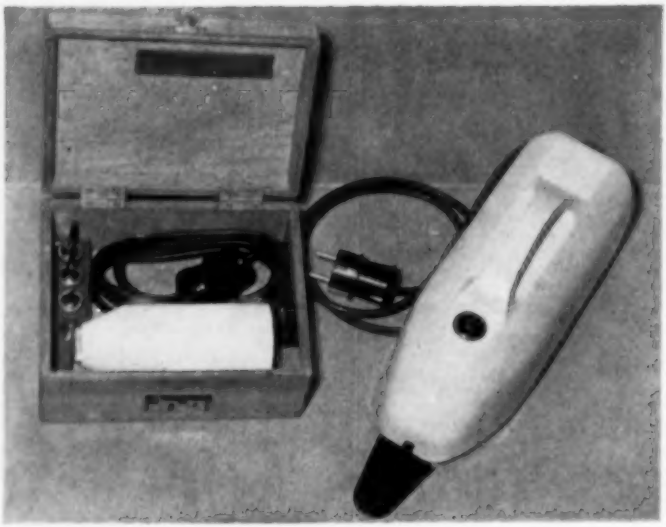

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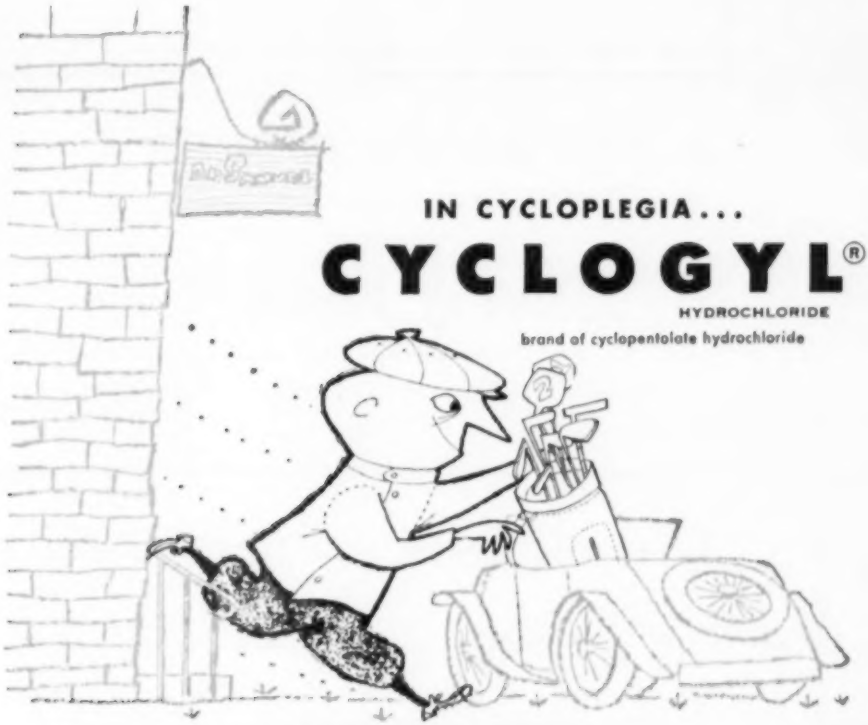

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1. Gordon, D. M., and Ehrenberg, M. H.: Am. J. Ophth. 38:831 (Dec.) 1954.

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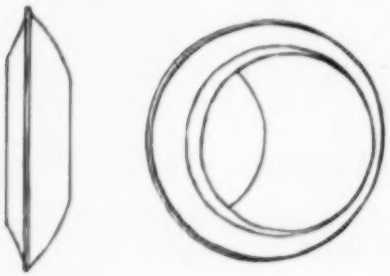

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The case that is often very trying to the practitioner is the one of a traumatic cataract in one eye and excellent vision in the other. The successful extraction of the cataract results in a very real problem for the ophthalmologist as well as his patient. The operated eye will project a retinal image approximately 25% larger than the image in the unoperated eye. If corrected with ordinary lenses, binocular vision is impossible because of the difference in retinal image sizes.

Some men have tried to keep the visual acuity good in both eyes by permitting the patient to use one eye for reading and the other eye for distance. This idea, of course, was calculated to keep the eyes from deviating by maintaining good acuity in both of them. Very often, unfortunately, this method didn't work, because without fusion there was no reason for the eyes to remain straight, and there was often a noticeable deviation.

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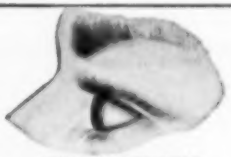

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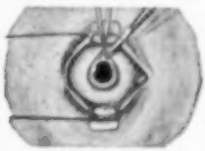

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HERPES ZOSTER AS A CAUSE OF CONGENITAL CATARACT*

PETER A. DUEHR, M.D.
Madison, Wisconsin

This paper is a report of two cases of congenital cataract in children whose mothers developed herpes zoster during early pregnancy. To date I have been unable to find a similar case reported in the literature.

In 1949, Gregg[1] first reported congenital cataract which had developed in infants whose mothers had German measles during the first trimester of their pregnancies. Since that initial report, many papers have been written on this subject.

Prendergast[2] reviewed the literature on rubella cataract in 1946, and asked the question, "Can other virus diseases suffered during these early months of pregnancy result in similar congenital defects in the offspring?" He had been informed by a pediatrician of a case of microphthalmos in an infant whose mother had had chickenpox during the early part of pregnancy but apparently congenital cataract was not observed in this case.

Jelliffe,[3] in Ibaden, Nigeria, more recently added impetus to these speculations by reporting the presence of a cataract in one eye of an 18-month-old child whose mother had noticed the white pupillary reflex since the patient was one month of age. The mother, aged 25 years, had had a high fever and rash during the third month of pregnancy. She was unattended during this illness, but Jelliffe presumed she had smallpox, since three children in the same compound were ill with a similar disease at that time. He speculates that varicella, mumps, influenza, hepatitis, and poliomyelitis might also cause congenital anomalies.

CASE REPORTS

CASE 1

History. R. D., aged four months, was referred for eye examination in February, 1951. At that time he was receiving treatment in the Orthopedic Department of the Wisconsin General Hospital for right talipes equinovarus. He was born on October 6, 1950, after a full-term gestation period and a normal labor.

Two weeks after birth the parents noted a white reflex in the pupils and congenital cataracts were diagnosed by the family physician. The child's vision had appeared to be poor since birth but it was believed he appreciated light with either eye.

Eye examination. There were coarse nystagmoid movements of the eyes, with a marked tendency to overdepression. The eyes appeared slightly microphthalmic. The upper lid sulci were very deep, probably because of sparse orbital fat. The corneas were slightly smaller than average; anterior chambers and irises appeared normal.

The pupils were round at 1.5 mm. and reacted normally to light stimulus. They dilated to 5.0 mm. after atropine (0.5 percent) instillation and revealed marked opacity of both lenses. The anterior subcapsular areas appeared white and crystalline centrally and there were radiating lines of opacification toward the periphery. The nuclei were densely opaque. No view of the fundi was possible.

* From the Department of Ophthalmology, University of Wisconsin Medical School.

Surgery. Because of the severity of the lens changes, it was felt that removal of the cataract from one eye should be undertaken without undue delay. Accordingly, in May, 1951, at the age of seven months, the right lens was needled by crucial incisions through the anterior capsule to a depth of about the lens center. The lens matter absorbed slowly, and the needling was repeated two months later.

In March, 1952, when the child was 17 months old, the lens capsule was opened by a one-cut discission across the center and, at the same time, the lens of the left eye was needled. The latter was found to be very thin, partially liquefied, and containing a central anterior subcapsular mass of white, chalky material. Within a few days the visual axis of each eye was quite clear and reactions of the child indicated some visual improvement.

Course. It was obvious from the earliest observations that the child was retarded mentally. He had failed to sit unaided and did not talk. The general physical examination was not remarkable except for the anomalies about the eyes and the talipes equinovarus. Urinalysis, blood count, and Wassermann reaction were normal.

In December, 1952, at the age of 25 months, the child died of meningitis, and, unfortunately, the eyes were not obtained for study.

Family history. There are three siblings—an older brother and sister and a younger sister, all in excellent health. His parents are well and give no history of congenital anomalies in their families. The eyes of siblings and parents are free of lens opacities. The maternal grandfather had senile cataracts, and a paternal aunt had cataracts after the age of 60 years.

Discussion. Pertinent in this child's history is the fact that his mother developed herpes zoster over a band-shaped area on the left side of the trunk in May, 1950. This was believed to be the fourth month of the patient's intrauterine life. No other illness of the mother occurred during this pregnancy. The virus infection was diagnosed and treated by the family physician,[4] who verified the diagnosis of herpes zoster.

CASE 2*

History. D. K., aged seven months, was seen in consultation on August 8, 1950. Her past history disclosed that she was a full-term infant, delivered by Caesarian section, and weighing six and one-half pounds at birth.

At the age of four months, it was obvious that she could not see well and at five to six months her eyes began to jerk and became crossed.

Examination of the eyes revealed a bilateral microphthalmia. The anterior chambers were of fairly good depth, and the pupils dilated to 5.0 mm. after homatropine and paredrine instillation. Both lenses revealed heavy nuclear cataracts. The fundi could not be seen, but transillumination was normal. The vision was very poor, the right eye being unable to fix and the left fixating a light very poorly.

Surgery. It was felt that because the cataracts were so dense, one lens should be needled and this procedure was carried out on the left eye by the ophthalmologist in charge. The eye responded poorly, and the pupil became updrawn and failed to clear.

Discussion. When the child was 16 months of age, the vision of her unoperated right eye had apparently spontaneously improved considerably and she was able to run and play out-of-doors. The lens showed a dense opacity in the nuclear area and a heavy cortical wedge anteriorly.

The child has a younger brother whose eyes are normal except that there is a periodic divergent squint. The patient's paternal grandfather had poor vision, the cause of

* I wish to thank Robert A. Moses, M.D., Delavan, Wisconsin, for permission to include his notes and observations in Case 2.

which is unknown. All other members of the three latest generations in this family have normal eye history.

The mother stated that she had had an uncomplicated pregnancy except that she developed shingles along the left lower costal region during the third month. The diagnosis of herpes zoster was confirmed by her family physician.[5]

Discussion

The clinical eye picture presented by these two patients is essentially indistinguishable from those in children with rubella cataracts. In their excellent papers, Gregg,[1] Reese,[6] and Cordes[7] describe two main types of rubella cataract: (1) Those with pearly white central opacity and a smaller clearer peripheral zone, and (2) those in which the entire lens is opaque.

In both of the cases here described there was very extensive opacification of the lenses, densest in the nucleus, at an early age. Dilatation of the pupils with homatropine and atropine was satisfactory, and prolonged use of atropine was tolerated well.

Gregg[1] stated that one of the problems of surgical management was the poor pupillary response to atropine, especially in microphthalmic eyes. Complications are multiplied in cataract surgery when microphthalmos is present because of the frequency of shallow chambers and the lack of space into which the needled lens can expand without irritation and damage to the adjacent structures and their function. The poor response to the needling operation in Case 2 emphasizes this point.

The microphthalmos in Case 2 was definite; it was only slight in Case 1. This anomaly is frequently reported in cases of rubella cataract and is common in our experience at the Wisconsin General Hospital.

A circumstance of importance in the cases under consideration was development of membranous cataract.

In Case 1 it was observed early in the study that both lenses had essentially the same appearance. When the right lens was needled, at seven months of age, it proved to have normal consistency and substance. Eight months later the left lens was found to be thin and membranous and, within a few days after the needling operation, it had absorbed completely, leaving a clear line of sight.

Likewise, in Case 2 the lenses had a very dense appearance when studied in August, 1950, when the patient was seven months of age. No fundus view was possible. Six months later the unoperated right lens appeared less opaque in the periphery, and the child was able to recognize people and to run and play with other children. This latter instance also suggests the possibility of a spontaneous general thinning of the lens.

Other instances of membranous congenital cataract are described in the literature. Long and Danielson,[8] in reporting six cases of rubella cataract, found a soft membranous cataract in one case. After discission operation, the pupil cleared readily. The child was nine months of age. The fellow eye had been needled at six weeks of age and had failed to clear.

Jeancon,[9] also in 1945, reported a congenital morgagnian cataract, and stated she had been unable to find a report of a similar case. She did not classify the cataract as having a virus etiology.

In 1946, Blake[10] described a membranous cataract in a seven-months-old child whose mother had had rubella during the second month of pregnancy, and he concluded that the cortex had failed to develop.

Gamble[11] discovered membranous cataracts in a six-months-old infant whose mother had rubella during pregnancy. He performed needling operations on both lenses and found them rubbery and difficult to incise.

Ehrlich[12] was the first to observe a rubella cataract become membranous. The membranous character of the cataract was proven

at operation when the child was three years old.

Comments

It is understandable that ophthalmic surgeons should feel the urgency for early operation when very dense bilateral congenital cataracts are found.

Reese[6] advises that these babies should be operated on immediately to permit sufficient light stimulus so that fixation may be developed and nystagmus prevented. He feels that the only contraindication to early operation is the general state of the baby's health. However, it is admitted by Cordes[7] that the results of surgery on rubella cataracts are only fair and, in the microphthalmic eyes, are poor—a view which has wide support.

One can only speculate as to how many of the virus cataracts would become membranous if operation were delayed for some months. It would seem that considerable judgment should be exercised in making a choice of the optimum time for surgical intervention in these cases. A partially absorbed cataract should respond more favorably than a complete lens, and an older eye responds better, as a rule, than one very young.

Since many of these infants are in poor general health, their eyes, in many instances, react poorly to mydriatics and the results are often disappointing. The more frequent resort to preliminary iridectomy would seem indicated in instances where there is poor pupillary response to atropine. We have found this procedure very useful at the Wisconsin General Hospital.

A measure of caution is warranted and indicated in any event. Furthermore, bilateral operation should be discouraged and the second eye left unoperated until the first has revealed the type of response one may expect. Again Case 2 illustrates the importance of this conservative approach.

As nearly as can be calculated, the mother of the patient in Case 1 suffered her attack of zoster during the fourth month of pregnancy. This would be a unique virus cataract, since rubella cataract is universally regarded as the result of an attack during the first three months of pregnancy. Cordes and Barber[13] stated in 1946, "A review of the literature fails to reveal a single case of cataract formation in which the mother had rubella after the third month."

Mention should be made of the other associated congenital anomalies in these cases. In Case 1 the child was definitely retarded mentally, a circumstance sometimes found associated in rubella cataract cases. Also present was talipes equinovarus which has been mentioned on ocassion in rubella case discussions[8] The multiplicity and severity of virus-produced congenital anomalies indicates the vulnerability of the embryo. Search for other etiologic factors causing congenital defects is again emphasized and encouraged.

Summary

1. Congenital cataracts in two patients whose mothers had herpes zoster during early pregnancy are reported.

2. Other congenital anomalies include mental retardation, microphthalmos, and talipes equinovarus.

3. In at least one case herein reported membranous cataract developed in one eye after the fellow eye had been operated.

4. Caution should be exercised in treating virus cataracts surgically.

5. Herpes zoster in early pregnancy produces congenital anomalies similar to those produced by rubella infection.

224 West Washington Avenue (3)

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SCLEROMALACIA PERFORANS*

Associated with retinitis pigmentosa and rheumatoid arthritis: Report of a case

Daniel W. Mathias, M.D.
Akron, Ohio

The association of retinitis pigmentosa with rheumatoid arthritis and scleromalacia perforans in the same patient is unusual, and the onset of scleromalacia perforans during ACTH and cortisone therapy adds further interest.

There is a definite possibility that this association of retinitis pigmentosa with the recognized syndrome of scleromalacia perforans and rheumatoid arthritis is a pure chance relationship. This combination would be very unlikely and such a relationship has not been previously reported. It is hoped that, if such a relationship has been observed by others, these findings may be brought forward and thus possibly contribute to our knowledge of these two conditions.

The relationship of retinitis pigmentosa with the rheumatoid arthritis-scleromalacia complex is in the realm of speculation but it can be noted that they are both degenerative diseases and both have been associated with generalized endocrine imbalance.

It is generally accepted that retinitis pigmentosa is a degenerative process involving the neuroepithelium with a variable genetic background.[3, 4, 8, 11] It has been associated clinically with the endocrine abnormalities of the Laurence-Moon-Biedl syndrome, Friedreich's ataxia, cerebellar ataxia, pigmentation of the skin, deafness, insanity, epilepsy, Ménière's syndrome, and acoustic neuroma.[4, 12] Associated ocular defects that have been described are color blindness, posterior polar cataracts, myopia, macular hole, nystagmus, and glaucoma.[7, 12]

The association of scleromalacia perforans with rheumatoid arthritis was originally brought out by Van der Hoeve.[10] A number of subsequent cases have been reported. No evidence of genetic background has been established but frequently there is a familial history of rheumatoid arthritis itself. It seems definite that scleromalacia perforans is a local rheumatoid lesion.[1, 11]

Scleromalacia has been reported in association with endocarditis lenta without rheumatoid arthritis.[2] It has also been noted together with porphyrinurea, skin atrophy of the face, and partial loss of eyelashes.[6]

ACTH and cortisone have been employed in the treatment of scleromalacia perforans with generally disappointing results. Anderson and Margolis report symptomatic improvement with local cortisone, but no

* From the service of Dr. Raymond L. Pfeiffer, Institute of Ophthalmology, Columbia-Presbyterian Medical Center, New York.

change in the underlying disease process.[1]

Talkov, Colpeys, Davis, Popper, and Feinberg[2] have, however, reported clinical and histologic regression of scleral nodules in a rheumatoid arthritis patient on this therapy. They did not distinguish nodular episcleritis and scleritis from necroscleritis nodosa and scleromalacia perforans, but considered them all to be varying manifestations of the same pathologic process. In the former necrosis of the scleral lamellae is not prominent as compared to the latter.

These authors stated that as the conjunctival hyperemia decreased in their case a "circumferential bluish band of choroid adjacent to the limbus became visible beneath the thin sclera for the first time." Their patient was treated for 34 days with cortisone.

The patient reported here was treated for 13 months. One may speculate that long-term ACTH-cortisone therapy may depress the inflammatory reaction around the rheumatoid focus in the sclera and contribute to the progression of necrosis of the sclera itself with subsequent thinning, and perforation.

Case report

In December, 1939, a 47-year-old white woman was first seen during an admission for surgical treatment of an infected finger and a diagnosis of retinitis pigmentosa was established. Relative night blindness and a ring scotoma were present, O.U. (fig. 1). No other abnormalities were noted. The patient was followed in clinic (fig. 2).

In May, 1947, diagnosis of rheumatoid arthritis was made by the Medical Service. The agglutination test for hemolytic streptococcus-A was positive and the sedimentation rate was 32 mm. in one hour. The patient improved on gold therapy but in October dermatitis occurred and the patient was treated with BAL. There were no ocular abnormalities noted other than the retinitis pigmentosa.

She was controlled symptomatically fairly well with salicylates but the sedimentation rate gradually rose and there were recurrent exacerbations of arthritic symptoms. In May, 1951, the sedimentation rate was 63 mm. in one hour. When last seen in December, 1951, the eyes were essentially unchanged except for some progression of the field defects.

She was not seen again at this hospital until just prior to the last admission. From January to April, 1953, she received 100 mg. of cortisone daily from her physician outside with resulting hypertension and ankle edema. From April, 1953, until one week prior to the present admission (February 2, 1954) she received 40 units of ACTH intramuscularly twice a week. She exhibited less toxicity on this drug but experienced symptomatic relief for only one day following each injection.

During this period she states her vision began to fail and the external appearance of her eyes began to change. She stated that she had been using cortisone locally but without benefit. Vision had become progressively worse and there had been a more rapid loss in the left eye in the week prior to admission.

The patient's mother died at the age of 45 years of "rheumatic fever." Her father never wore glasses and has no eye disease at the present time. (He has not been examined by an ophthalmologist.) No history was available of the grandparents as they were never in this country and are little remembered. The patient's 69-year-old sister just had a successful cataract extraction elsewhere and has normal eyes with that exception. Cousins are all normal without night blindness as far as the patient knows. No consanguinity among patient's antecedents is known.

Physical examination by the medical consultant revealed typical rheumatoid arthritis involving all of the peripheral joints. X-ray studies of the spine revealed moderate demineralization and minimal osteoarthritic changes of the lumbar spine. An electrocardiogram was normal.

Vision was: O.D., hand movements at 10

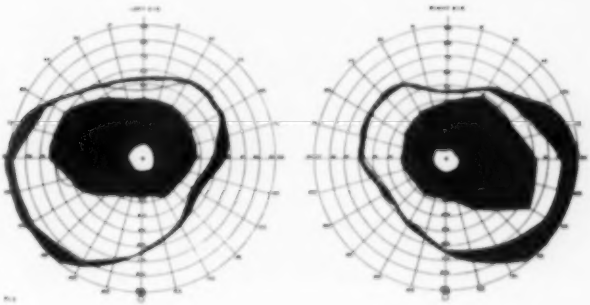

Fig. 1 (Mathias). Central and peripheral visual fields for a five-mm. white test object at 330-cm. distance on January 3, 1940. Vision with correction: O.D., 20/20—1; O.S., 20/30.

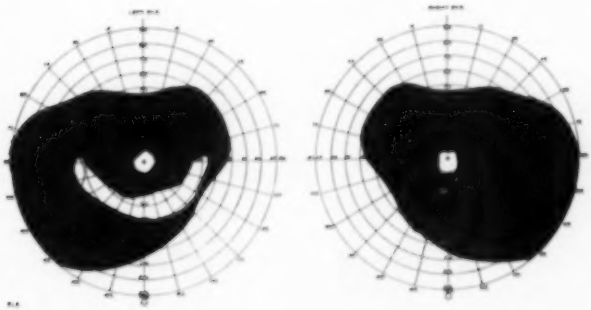

Fig. 2 (Mathias). Central and peripheral visual fields for a five-mm. white test object at 330-cm. distance on June 30, 1941. Vision with correction: O.D., 20/70; O.S., 20/30.

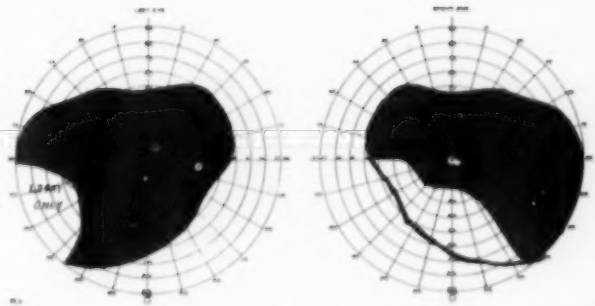

Fig. 3 (Mathias). Central and peripheral visual fields for a 35-mm. white test object for the right eye, and light perception for the left eye at 1,000-cm. distance on February 16, 1954. Smaller test objects not visible. Vision: O.D., hand movements; O.S., light perception

inches; O.S., hand movements at 14 inches.

Visual field. There was severe constriction with an inferior nasal island for 35-mm. white test object at one meter distance, O.D., and extreme inferior temporal area of light perception only, O.S. (fig. 3).

Finger tension was normal, O.U.

External. Moderate superficial palpebral and bulbar conjunctival hyperemia was present, O.U. Nasally in each eye, an irregular protruding bluish-black mass was seen beneath intact conjunctiva. The area was much larger in the right eye. There was flattening and thinning of the sclera around the limbus of each eye, but especially the left. The cornea was not involved in either eye (figs. 4 and 5).

Anterior chamber. Slight flare and a moderate number of small pigmented floaters were seen in the aqueous, O.U. There were scattered small pigmented keratic precipitates, O.U. The pupils measured four mm. each and were fixed and slightly eccentric.

Lens. Posterior polar cataract was present,

Fig. 4 (Mathias). External appearance of right eye.

Fig. 5 (Mathias). External appearance of left eye.

O.S. There were moderate anterior and posterior cortical opacities, O.U.

Vitreous. A moderate number of stringy and clumplike floating opacities were present.

Fundus. Examination was difficult due to lenticular and vitreous changes but attenuation of the retinal arterioles and typical bone-corpuscle type of pigmentation in the equatorial zone could be readily made out in each eye. The left disc was pale. There was an occlusion of the superior temporal vein of the left eye when first examination was carried out. This rapidly progressed to the

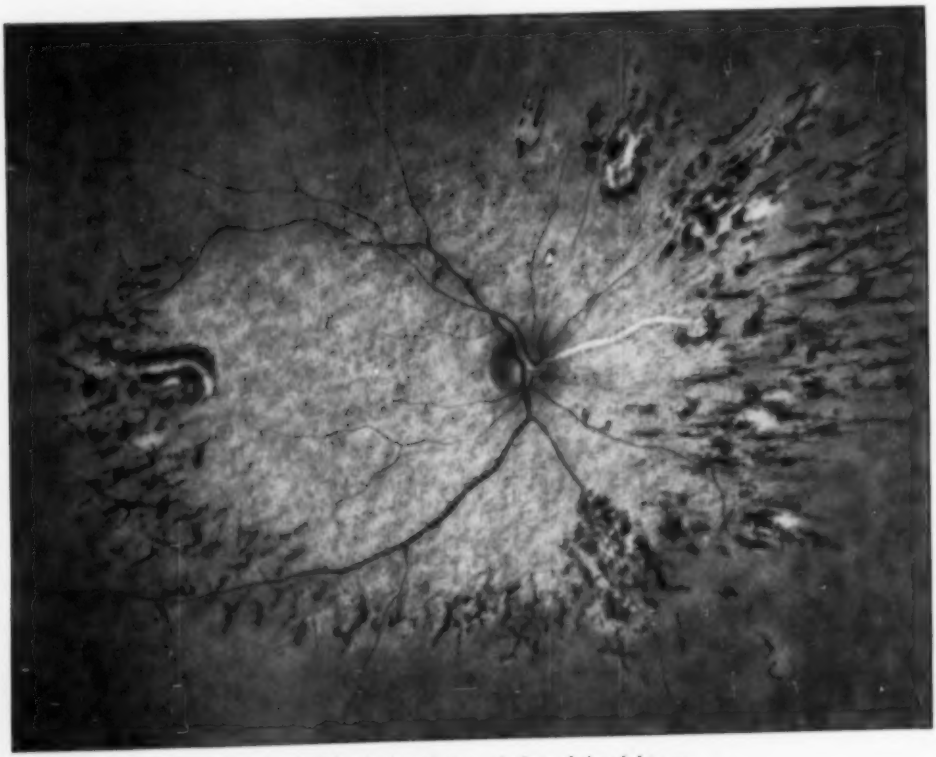

Fig. 6 (Mathias). Fundus painting of the right eye.

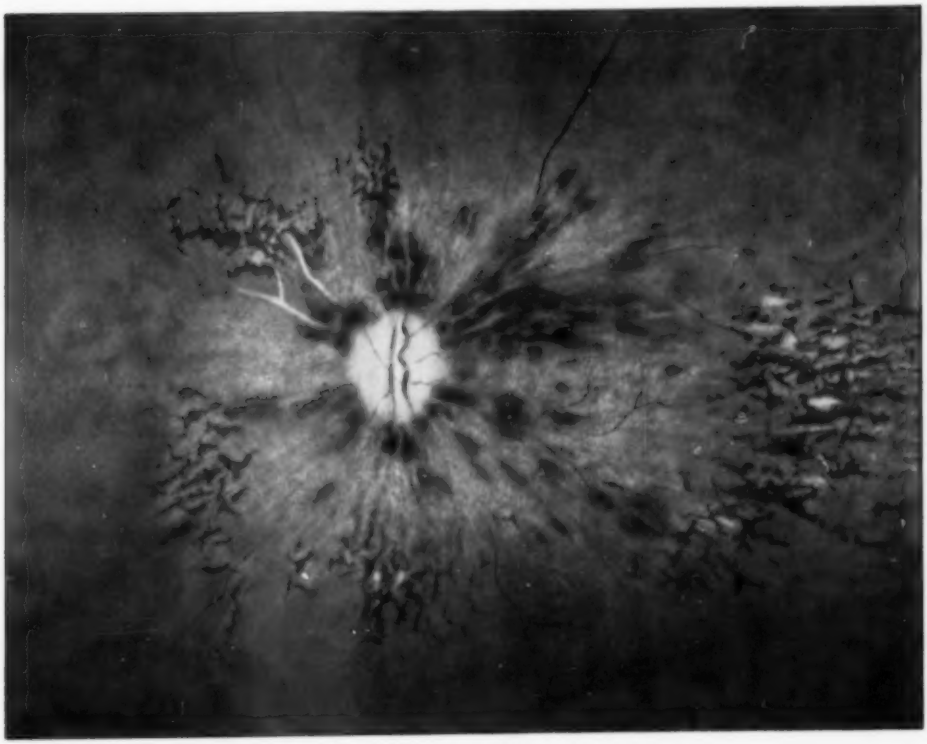

Fig. 7 (Mathias). Fundus painting of the left eye.

ophthalmoscopic appearance of total occlusion of the central retinal vein (figs. 6 and 7).

Laboratory studies. Hemogram and urinalysis were completely normal. Sedimentation rate 85 mm. in one hour. Blood sugar, two hours after breakfast, 113 mg./100 cc. Blood urea nitrogen, 13.5 mg./100 cc. Serum potassium, 4.2 milliequivalents/liter. Calcium 9.3 mg./%. Phosphorus, 3.5 mg./100 cc. Total protein, 6.2 gm./100 cc. Albumin, 3.6 gm./100 cc. Globulin, 2.6 gm./100 cc. Cholesterol, 231 mg./100 cc. Cephalin flocculation test, negative. Thymol turbidity, negative.

Subsequent course. Arthritic symptoms have been adequately controlled by salicylate therapy. The sedimentation rate has remained elevated, however. There has been some gradual absorption of the hemorrhages in the left fundus and some new vessel formation but vision has remained the same. There has been no change in the scleromalacia perforans in the month since the patient's discharge from the hospital.

Summary

A case of retinitis pigmentosa, scleromalacia perforans, and rheumatoid arthritis is presented. Retinitis pigmentosa preceded the development of rheumatoid arthritis by at least seven years, and preceded the onset of scleromalacia perforans by at least 13 years. The onset of scleromalacia came about during prolonged ACTH-cortisone therapy.

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Acknowledgements. I wish to thank Mr. E. G. Bethke for the excellent fundus paintings, and Mr. James Lafayette for the photographs of the external eye.

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THE ELECTRORETINOGRAM IN CHOROIDEREMIA*

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Two brothers with the fully developed clinical picture of choroideremia, their two full sisters, and one half sister were recently seen in the Department of Ophthalmology. Not enough members of this family have been studied to demonstrate the type of inheritance involved, but these patients seem to fit well into the picture described by McCulloch in 1947.[1]

The oldest brother, C. J., aged 39 years, had no ocular complaint, but admitted on questioning some difficulty with night vision. Examination of his fundus showed a far-advanced picture of choroideremia with a remaining patch of choroid at the macula and a few patches in the periphery. His visual acuity was 20/30 without correction in each eye. The visual field of the 1.0- and 5-mm. target at 1,200 mm. on the tangent screen was constricted to about five degrees. On the Goldmann perimeter, in addition to the central field, there were found small islands of peripheral field corresponding to the remaining areas of choroid seen in the fundus.

The second brother, A. R., aged 38 years, was first examined in this hospital at the age of 20 years, at which time he already had a history of night blindness since childhood. Since 1935, his visual acuity had decreased from 20/20 to 20/100, and the five-degree central field had decreased to three degrees in size. His fundus also showed the typical picture of choroideremia.

All the sisters had normal visual acuity with correction and a normal visual field. None gave a history of ocular difficulty except for minimal refractive errors. Neverthe-

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less, all showed a pigmentary change in the fundus typical of the carrier state of choroideremia.

In one sister, J. M. B., aged 35 years, was found a very pronounced radial arrangement of pigment deposits in the periphery of the fundus. The second sister, F. P. K., aged 34 years, had been told some years before on the basis of the fundus appearance that she had retinitis pigmentosa and could expect to go blind. A pigmentary change with pigment proliferation which was not grouped around the blood vessels was seen. In addition there were atrophic areas in the pigment epithelium especially in the inferior periphery and a paramacular pigment disturbance. In the fundus of the half sister, P. M. S., aged 27 years, a rather extensive pigmentary disturbance was present.

Dark adaptation on the Goldmann Adaptometer was studied on one of the males and two of the carriers. The adaptation of the two females was normal, even exceeding that of a young normal subject. However, the two carriers were able to see the light only intermittently in the cone phase of the adaptation, whereas, a normal subject will perceive the light continuously.

The male patient with choroideremia not only showed about three minutes' delay before he was able to see the light stimulus, but could not see the test pattern at less than one-tenth of the original intensity even with prolonged time in the dark, while one of the carriers was able to observe the light at one ten-millionth the original intensity. Thus the male not only showed absent rod adaptation, but also poor cone adaptation.

Electroretinograms were recorded in the two males and three of the carriers. The technique was similar to that previously described by Burian.[3] A high intensity stroboscopic flash of short duration (30 microseconds) was used as a stimulus. A speculum-contact lens electrode was employed and the recordings were made with an ink writing oscillograph.

In the males the electroretinogram was extinguished in both light and dark adaptation. Figure 1A shows the record of patient, C. J., after five minutes of dark adaptation. The lower line represents the light flash and the small waves in the upper line represent eye movements and not an electrical response of the retina. Figure 1B shows that the electroretinogram in patient A. R. is extinguished even after 17 minutes of dark adaptation.

The electroretinograms of the three carriers were quite interesting (fig. 2). In light adaptation the amplitude of the a-waves varied from 38 microvolts to 53 microvolts. The amplitude of b-wave varied from 71 to 85 microvolts. There was only 3.3 milli-

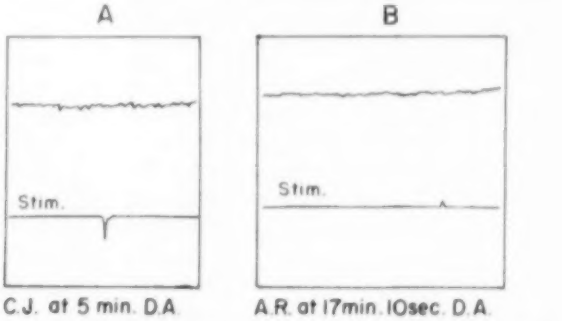

Fig. 1 (Bounds and Johnston). Electroretinogram of patients with choroideremia. In both cases the electroretinogram is extinguished.

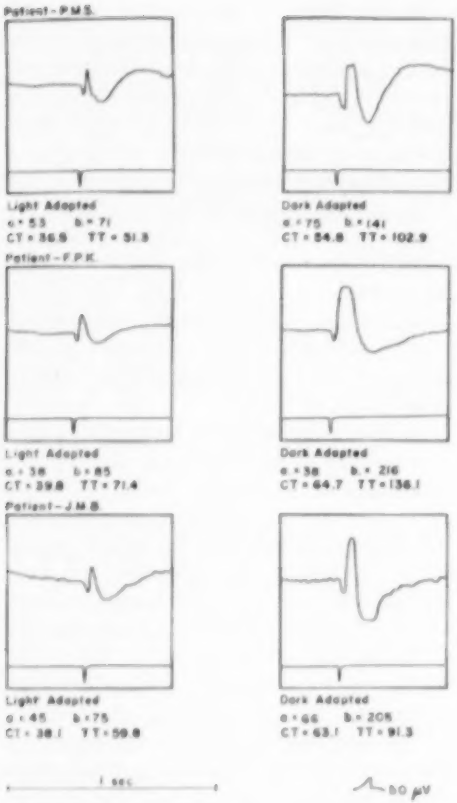

Fig. 2 (Bounds and Johnston). Electroretinograms of three female carriers of choroideremia. All dark-adapted electroretinograms recorded after seven minutes of dark adaptation. (a) Amplitude of a-wave in microvolts. (b) Amplitude of b-wave in microvolts. (CT) Culmination time of b-wave. (TT) Total duration of electroretinogram in milliseconds.

seconds' difference in the culmination time of the three. The main difference was in the total time of the electroretinograms, this varying from 51.3 to 71.4 milliseconds.

With dark adaptation the difference in the electroretinograms was more marked. The electrical response of patient P. M. S. was characterized by the a-wave of the greatest amplitude and a marked double-peaked component of the b-wave. The culmination time and total time were the shortest in this patient. In Figure 3 is seen the amplitude of the a- and b-waves and the duration of the b-wave in light and dark adaptation up to 15 minutes. The response of the b-wave was increased up to about 10 minutes paralleling closely the increase of the subjective threshold in dark adaptation. The maximum amplitude of the b-wave was 270 microvolts and the a-wave 110 microvolts. The maximum duration of the b-wave was 58 milliseconds.

In patient F. P. K., the most normal appearing b-wave was found. The record was also characterized by the smallest a-wave, but the longest culmination time and total time (fig. 2). In Figure 4 are shown the amplitude

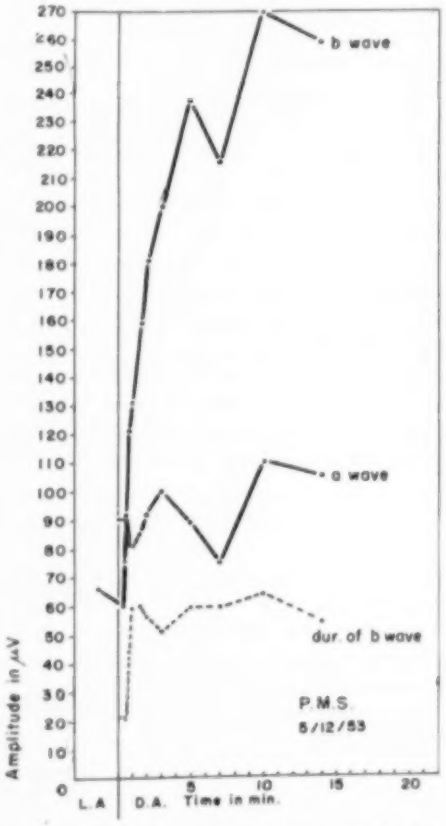

Fig. 3 (Bounds and Johnston). Diagram showing increase in amplitude of a- and b-waves and duration of b-wave during dark adaptation in carrier P. M. S.

of the a-wave and b-wave and the duration of the b-wave found in this patient in the light-adapted state and in the course of dark adaptation. Here the maximum a-wave was 50 microvolts, and the b-wave 260 microvolts. The maximum duration of the b-wave was 110 milliseconds.

In patient J. M. B., a narrow b-wave of moderate amplitude was noted and the total time was less in this patient than in the two other carriers (fig. 2). The maximum b-wave was 210 microvolts, the a-wave 70 microvolts, and the maximum duration of the b-wave 80 milliseconds (fig. 5).

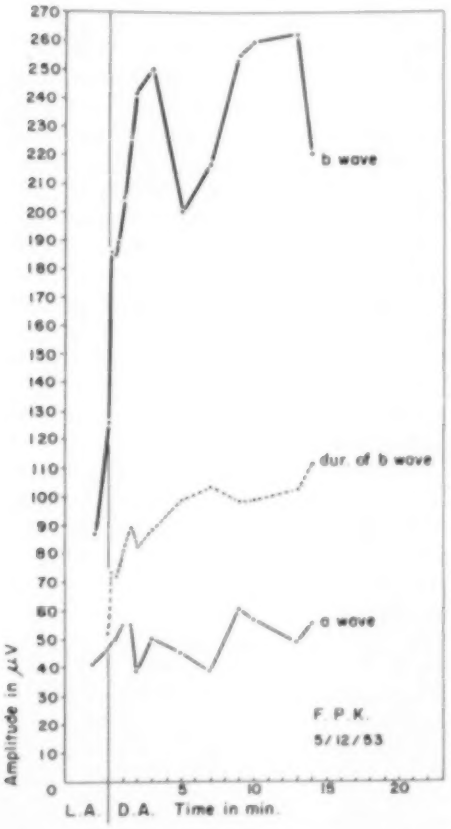

Fig. 4 (Bounds and Johnston). Diagram showing increase in amplitude of a- and b-waves and duration of b-wave during dark adaptation in carrier F. P. K.

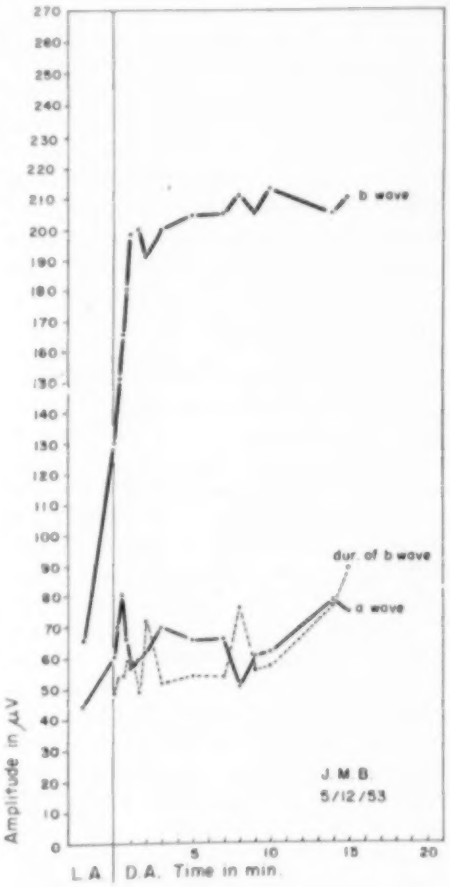

Fig. 5 (Bounds and Johnston). Diagram showing increase in amplitude of a- and b-waves and duration of b-wave during dark adaptation in carrier J. M. B.

Discussion

There appeared to be no relation between the fundus picture of the carriers and the electroretinogram. In patient F. P. K., the greatest pigmentary change and atrophy were found; consequently, one might have expected a subnormal electroretinogram, but this was not confirmed. It is our impression that the variations in the electrical response of the retina in the carriers are within normal limits as similar variations have been found

in some of our normal subjects.

Thus the fundus findings in the carriers seem not to entail a functional impairment of the retina. It must, however, be pointed out that the measurement of the dark adaptation with the Goldmann Adaptometer is restricted to an area of 11 degrees in diameter located 12 degrees below the fovea and that a global stimulus was employed to obtain the electroretinogram. Further investigations will have to determine whether there are regional differences in dark adaptation and electroretinograms of these carriers.

The absence of an electrical response from the retinas of the two patients with choroideremia would seem to throw some light on the place of origin of the electrical potentials in the normal retina. According to McCulloch[3] the essential pathologic finding in choroideremia is atrophy of the choroid with secondary atrophy of the retina. In the areas in which there is total absence of the choroid, the pigment epithelium of the retina, the rods and cones, and their nuclei are missing. Where some remnants of the choroid are present, traces of these retinal structures can be found. However, the loss of the choroid does not seriously affect the bipolar cells, the ganglion cells, the nerve-fiber layer, or the optic nerve.

According to Granit,[4] P-II, the electric process responsible for the b-potential of the electroretinogram is localized in the synaptic layers, and Bartley[5] suggested the bipolar cells as the place of its origin.

More recently Noell,[6] from experiments with iodoacetic acid and sodium iodate, limits the possible sites of a-wave and b-wave generation to a region extending from the outer limbs of the rods and cones to the outer plexiform layer, the a-wave being related more to the distal portion of this region and the b-wave more to its proximal parts. The lack of any electrical response in patients with choroideremia would tend to support Noell's analysis in view of the pathologic findings in choroideremia.

Summary

Dark adaptation has been studied in one patient with choroideremia and two carriers of choroideremia. The electroretinogram has been recorded in two patients with choroideremia and in three carriers. In the male patients with choroideremia, dark adaptation was very deficient, indicating absent rod adaptation and poor cone adaptation, and the electroretinograms were extinguished in the males. Since pathologic studies have revealed that the secondary retinal atrophy in choroideremia concerns only the pigment epithelium and the rods and cones with their nuclei, the failure to obtain an electroretinogram in these patients would seem to support the view expressed by Noell[6] that both the a-potentials and b-potentials originate external to the external plexiform layer.

Both dark adaptation and the electroretinograms were essentially normal in the female carriers of choroideremia.

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VARIATIONS IN QUALITY OF TARGET FOR FLICKER-FUSION FIELD TECHNIQUE*

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Several investigators have confirmed that the use of the flicker-fusion phenomenon provides a type of visual field test which for many purposes is more sensitive and accurate than standard methods in common use.[1-8] It has been found useful for detecting the presence of early glaucoma and early neuro-ophthalmologic disease.[9]

While a great deal of work has been done to compare the flicker-fusion rate with different intensities, colors, areas, and light-dark ratios of the target, there has been no indication that a particular combination might be superior for clinical purposes.

To begin this evaluation, we procured a variable frequency square wave generator in which the on-off ratio of the cycle could be changed continuously from 10 percent on 90 percent off to 90 percent off and 10 percent on, and in which the intensity of the impulse could be varied. Using a vacuum tube designed for inscribing sound waves on movie film, with appropriate focusing and diffusion, a target of a bluish-white color was produced. The light intensity measured by a photographic light meter directly against the surface could be varied continuously from three to 37 foot-candles. The target was placed at the end of a wand in the usual way, and used with a spheric 67-cm., curved wire perimeter extending to 50 degrees. The background was a painted gray wall reflecting about 1.5 foot-candles. At the eye, the target disc subtended an angle of about two degrees.

Berg,[10] Crozier and Wolf,[11] and Best[12] have suggested that, for testing the flicker-fusion frequency, it would be more accurate to hold the flicker frequency constant, and gradually raise the intensity until flicker appeared. We tried this in preliminary tests on patients with the moderate range of intensities available and found the results repeated poorly and the patients less certain about the end-points. We used a constant rate of 45 flashes per second, which would obviously not be the optimum in all patients.

Erlick and Landis[13] discussed the difference in flicker rate and repeatability in flickering lights driven by the Strobotac, the instrument in clinical use by Miles for several years in which each flash duration is about 48 microseconds, and instruments in which the flicker is created by a rotating disc, and a square wave generator. They reported a variation in comparative flicker rates of about three flashes per second, the Strobotac being higher. They concluded that with a shorter light interval, the retina had more time in which to rest and recover before the next flash. The mechanical rotating disc is more cumbersome for clinical purposes, but does not drop flashes and therefore interfere with the test as most electronic machines do.

Winchell and Simonson[14] concluded that flicker-fusion tests in which the light interval was short compared to the dark were more repeatable and dependable. Crozier and Wolf[11] had made the same observation.

In the clinical use of flicker-fusion fields, it must be kept in mind that individual variations of the entire field in a uniform manner is not always important. One must compare the flicker rate of one part of a field with that of a symmetric part of the other side. In

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tests for neuro-ophthalmologic lesions, flicker fields are much like comparing the knee-kick or the ankle-jerk of one side against the other. There are marked individual variations in the vigor of a knee-kick in a group of normal persons. In glaucoma, one similarly compares the flicker rate above and below the median horizontal raphe in symmetrically paired areas. It is not well adapted to tracing field contours.

Flicker-fusion fields were obtained on 10 "normal" individuals who had no significant eye abnormality and whose vision was normal. Only the right eye was tested, but the other was not completely occluded. Two pairs of goggles are used for occlusion, the eye not being examined being occluded by a white plastic shield. A chinrest was used, with a bar for the forehead. No attempt was made to control pupil size. The flicker-fusion rate was determined by reducing from fusion to flicker until repeat determinations gave identical results.

Fig. 1 (Miles and Trapp). Averaged values for flicker-fusion fields of the right eyes of 10 "normal" individuals with the intensity constant at 27 foot-candles and varying light-dark ratios. Overlined figure—10 percent on, 90 percent off. Underlined figure—75 percent on, 25 percent off. Unmarked figure—50 percent on, 50 percent off. The central circle encloses the three results at the fovea. Each concentric ring represents successive 10-degree distances from the fovea, the blocks in each ring enclose the three results obtained at a point at the center of the block.

Flicker-fusion fields on the 10 "normal" individuals were obtained with light-dark cycles of 10 percent on, 90 percent off: 50 percent on, 50 percent off: and 75 percent on, 25 percent off. The intensity was held constant throughout at 27 foot-candles. The average results of these 10 "normals" are plotted in Figure 1.

It may be seen from the above that the flicker-fusion frequencies are remarkably constant at any given distance from the fovea for any of the light-dark ratios, the rate falling off continuously toward the periphery.

The foveal flicker-fusion frequency averages slightly less than for the immediate perifoveal region.

The over-all patterns of the fields are essentially uniform for the three light-dark ratios tested, although the critical flicker-fusion rate becomes progressively lowered as the light period is lengthened and the dark period shortened.

Calculation of the average deviations from the mean at each of the 33 points tested increased uniformly from 1.2 flashes per second at the fovea to 4.2 flashes per second in the periphery. Although the results were very similar, at almost every point in the field the average deviation from the mean was least with the 10 percent on-90 percent off light-dark ratio, and slightly greater with the 75 percent on-25 percent off ratio. The 50 percent on-50 percent off average deviation lay between. This was suspected clinically as the tests were performed, for the individual being tested almost invariably seemed more certain of his response and to have less hesitation in deciding whether flicker was present when the shortest light flash was being tested.

The differences between the average deviation from the mean for each light-dark ratio at each point in the field were less than anticipated from the apparent ease of decision as to the end-point noted with the short light, long dark-period ratio. The differences

between the average deviations from the mean at any point for the three light-dark ratios varied from 0.1 flash per second at the fixation point to 1.5 flashes per second in the periphery.

The procedure was repeated on the same 10 "normal" individuals, using two widely varying intensities of the light source, four and 15 foot-candles, with a light-dark ratio constant at 50 percent on, 50 percent off. A third intensity of 27 foot-candles was obtained by using the fields obtained at that light-dark ratio from the first procedure.

The average results from the 10 "normal" persons are given in Figure 2.

Again, the flicker-fusion frequencies are seen to be reasonably constant for any of the intensity levels studied at any constant distance from the fovea. The rates again fall off progressively toward the periphery.

The over-all patterns of the fields are essentially the same for the three levels of target light intensity studied, although the critical flicker-fusion rate becomes progressively less as the intensity is reduced.

Calculation of the average deviations from the mean as before again showed a smaller average deviation for the highest light intensity studied than for the lowest, with the mid intensity lying between the two. However, the difference between the highest and lowest intensities varied only from 0.5 flash per second at the fixation point to 1.4 flashes per second in the periphery. It was noted that the observer seemed more certain of the end-point and responded with less apparent hesitation with the high level of target light intensity.

Flicker-fusion fields were next performed on five eyes with chronic simple glaucoma in various stages of the disease. By conventional perimetry all five eyes gave pathologic fields typical of the disease showing from early to late changes.

The flicker-fusion fields were performed using the same variations in light-dark ratio and intensity as used in the preceding 10 "normal" individuals. In all five cases the

Fig. 2 (Miles and Trapp). Averaged values for flicker-fusion fields on the right eyes of 10 "normal" individuals with the light-dark ratio constant and varying intensities. Overlined figure—27 foot-candles. Underlined figure—4 foot-candles. Unmarked figure—15 foot-candles.

areas of depression to the flickering light corresponded to the depressed areas elicited by the conventional method. However, the purpose of the procedure was not to compare the two methods, but to determine whether or not one particular combination of light-dark ratio and intensity demonstrated the field defect better than another. Because of the wide individual variations in the fields of the glaucomatous eyes, the results could not be averaged and compared as was done with the "normal" eyes. However, simple inspection of the resulting fields revealed that although the numerical values at any one point varied depending upon the light-dark ratio and intensity, the depressed area was equally apparent in all fields. The numerical differences of flicker-fusion frequency between two adjoining points in the field were approximately the same, no matter the stimulus selected. As in the "normal" individuals, the critical flicker-fusion frequency at any one point was highest in the short flash-long dark period stimuli and became less as the length of the flash was increased (fig. 3).

This critical flicker-fusion frequency was

Fig. 3 (Miles and Trapp). Typical flicker-fusion fields of the right eye of a patient (M. E. W.) with chronic simple glaucoma. Intensity constant at 27 foot-candles varying light-dark ratios. Overlined figure—10 percent on, 90 percent off. Underlined figure—75 percent on, 25 percent off. Unmarked figure—50 percent on, 50 percent off.

Fig. 4 (Miles and Trapp). Typical flicker-fusion fields of the right eye of the same patient with chronic simple glaucoma with light-dark ratio constant (50 percent on, 50 percent off) and varying intensities. Overlined figure—27 foot-candles. Underlined figure—4 foot-candles. Unmarked figure —15 foot-candles.

likewise higher with the higher light intensities, as had also been noted before in the 10 "normals" (fig. 4). However, in the case of interpretation of the field defects the actual level of the critical frequency made no difference since the variation between the adjoining points in the field was approximately the same with each of the stimuli used.

Summary and Conclusions

1. Flicker-fusion fields were obtained by measuring the critical flicker-fusion rate at 33 points in the fields of the right eyes in 10 "normal" individuals and five patients with chronic simple glaucoma. The light-dark ratio was varied from 10 percent on-90 percent off to 75 percent on-25 percent off, the light intensity being held constant. The fields were repeated so as to give three different intensities of the target light source at a constant light-dark ratio. The averaged results of the 10 "normal" eyes are plotted, and a typical example of a glaucomatous field is given.

2. No striking advantage of either a particular light-dark ratio or a particular target intensity could be demonstrated for either the "normal" or glaucomatous eyes, over the range tested, although the impression was gained clinically that the short light-long dark period ratio and the high level of target intensity made interpretation of the critical flicker fusion easier for the patient. For the 10 "normal" eyes calculation of the average deviations from the mean at all points corroborates this impression but with such slight differences as to be probably insignificant at the present levels of refinement of the technique.

640 South Kingshighway (10).

183 North Upper.

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ELEVATION OF INTRAOCULAR PRESSURE DUE TO HORMONAL STEROID THERAPY IN UVEITIS*

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INTRODUCTION

The question of the possible effects of systemic steroid therapy on intraocular pressure has, to some extent, been considered by other investigators. That this therapy has sometimes initiated or exacerbated a glaucoma that was secondary to a uveitis, as in our own cases, has been briefly mentioned in a discussion by McLean.[3] He noted that, in treating over 40 cases of various forms of uveitis with ACTH, a few of the cases developed a secondary glaucoma or experienced an acceleration of a secondary glaucoma while on that therapy. It was his opinion that the steroid therapy itself seemed responsible.

One of our cases was that of a Puerto Rican woman. The other two were in children with sarcoid uveitis. This disease is rare in children. Oblath and Farber[4] (1950) reported a series of 40 cases of sarcoid uveitis seen in California. Among these only three were in patients 15 years of age or younger. In a series of 29 proven cases of generalized sarcoidosis reported by Woods and Guyton[5] (1944), 15 were complicated by uveitis and only two of the 15 were in patients 15 years of age or younger. According to the Thornhills,[6] eye involvement is especially rare in children.

Kimura, Hogan, and Thygeson[2] reported a series of 810 cases of uveitis seen in San Francisco. Of these 810, only 47—less than six percent—were in children under 16 years of age. Of these 47 cases, only one was a case of sarcoidosis and this in an 11-year-old Negro girl.

* From the Eye Service of the Mount Sinai Hospital. This paper was presented before the Section for Ophthalmology, New York Academy of Medicine, March 15, 1945.

CASE REPORTS

Each of our three patients had sarcoidosis, as was established by lymph-node biopsy and Nickerson-Kvein skin tests.* In all cases serology was negative, and any coexistent infective foci were eradicated. None as yet have had toxoplasmosis skin tests. None had any pulmonary infiltrations. All were treated with systemic and local cortisone and/or hydrocortisone, and/or ACTH gel. All received mydriatics or miotics at whatever time these respective local medications seemed appropriate.

CASE 1

A. S., aged 14 and a half years, a Negro boy, had intraocular disease first diagnosed about two years ago. When first seen, he had bilateral uveitis with numerous large, mutton-fat type keratic precipitates; anterior chamber, two-plus flare and slow-moving cells; fundi hazily visualized. Vision was: O.D., 20/200; O.S., 20/100 (without glasses). Tension was normal to fingers bilaterally. A second strength tuberculin test was one plus. A brucellosis skin test was questionable but was considered probably negative. The patient was living with his stepfather who had active pulmonary tuberculosis. The patient was underweight.

Due to parental negligence, our prescribed medication was omitted for about two weeks so that, when next seen, the patient had considerable bilateral posterior synechias. On hospitalization, May 4, 1953, the sedimentation rate was 83 mm./hr. There was microcytic hypochromic anemia with hemoglobin, 10 gm., and moderate leukocytosis. Urinalysis showed a faint trace of albumin, rare to occasional RBC, rare to three WBC and two casts—all high-power field in centrifuged specimen. Also noted were splenomegaly, hepatomegaly, palpable, epitrochlear and cervical lymph nodes.

This case shows the rise of intraocular pressure with the steroid therapy.

The tension of the right eye dropped from 22 to 5.0 mm. Hg (Schiøtz) and remained there under local mydriatics until ACTH gel was administered. There was an immediate tension rise to 35 mm. Hg and the tension varied between 20 and 32 mm. Hg when a change was made to cortisone by mouth. As soon as the cortisone was discontinued the tension dropped to 10 mm. Hg.

In the left eye the tension dropped from 22 to 5.0 mm. Hg under mydriatic therapy. When ACTH gel was administered, the tension rose to 80 mm. Hg, necessitating a paracentesis followed by repeated daily reopenings during which the tension hovered between 24 and 40 mm. Hg, while under cortisone therapy by mouth. After a cyclodiathermy the tension finally dropped to 10 mm. Hg.

On a second admission two months later, the tension of the right eye did not rise under cortisone but did rise as high as 65 mm. Hg with ACTH gel, necessitating a modified Lagrange operation. Thereafter, the tension remained within normal limits even with cortisone and hydrocortisone.

The left eye had a rise in tension up to 52 mm. Hg with cortisone and here also a modified Lagrange operation was performed. The tension varied up to 52 mm. Hg thereafter during the administration of cortisone and hydrocortisone and came down to normal only when both these steroids were finally discontinued.

On a third admission, after bilateral modified Lagrange operations, administration of cortisone raised the tension of the right eye from a low of 10 mm. Hg to a high of 30 mm. Hg which came down to a level of 20 mm. Hg after cortisone was discontinued. In the left eye there was a rise from a low of 12 mm. Hg to a high of 32 mm. Hg which gradually came down to 20 mm. Hg after the cortisone was discontinued.

* The administration of cortisone, hydrocortisone, and ACTH gel, and the conduction of the Nickerson-Kvein tests were under the auspices of the special therapy-sarcoid department, staffed by Dr. Siltzbach and his colleagues.

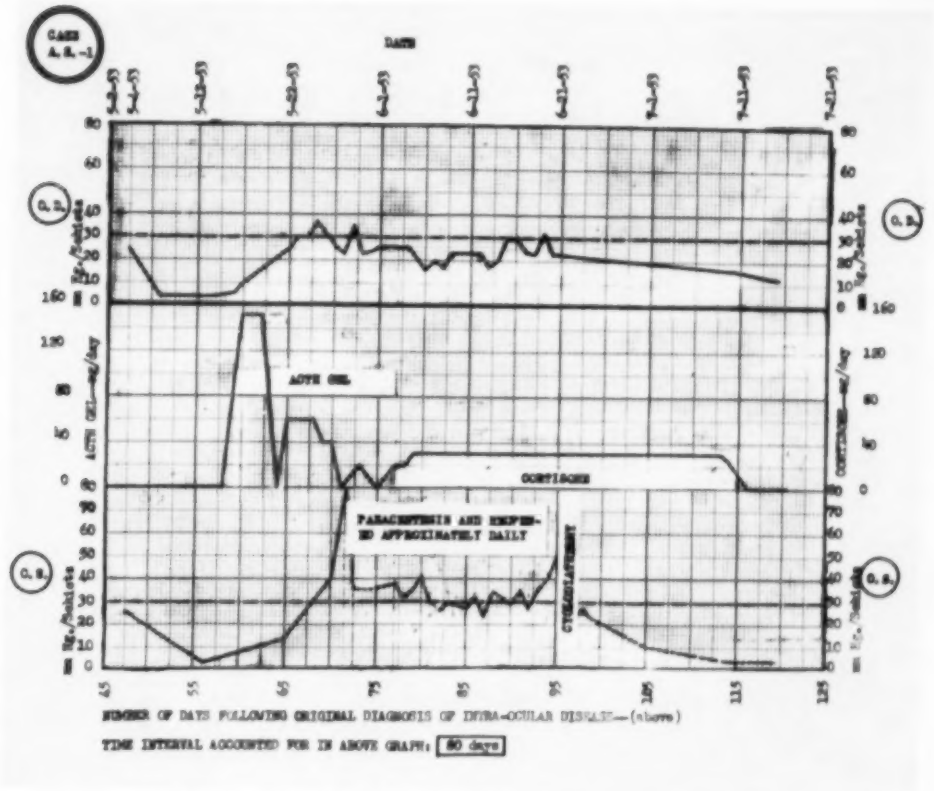

Fig. 1 (Laval and Collier). *Case 1.* Relationship between intraocular pressure and steroid hormone therapy.

This patient's graphs (figs. 1, 2, and 3) show a definite relationship between the rise in tension and the administration of cortisone or of ACTH but much more marked while under ACTH therapy.

CASE 2

G. O., aged 14 and one-half years was a Negro girl in whom intraocular disease was first diagnosed about seven years ago. This patient was hospitalized in 1939 for idiopathic hemolytic anemia and rickets. In 1946, generalized sarcoidosis was diagnosed. In 1947, she was on the eye ward for chronic sarcoid iridocyclitis. In 1950, she underwent splenectomy for hemolytic anemia of unknown cause. This improved her anemia.

In March, 1953, the right optic disc was cupped; there were posterior synechias; tension was, O.U., 55 mm. Hg; vision was O.D., nil; O.S., 20/30. On April 6, 1953, this patient was hospitalized, at which time it was noted:

O.U., keratic precipitates of varying size; some epithelial edema; no cells and no definite flare. O.D., disc cupped; O.S., disc good color.

Sedimentation rate was 52 on April 18, 1953, and became 25 on April 28, 1953. The blood count was normal. Urinalysis, negative except for trace of albumin. The reason no operation was done on the right eye in spite of its persistent high tension is that the eye had no light perception, and the patient had

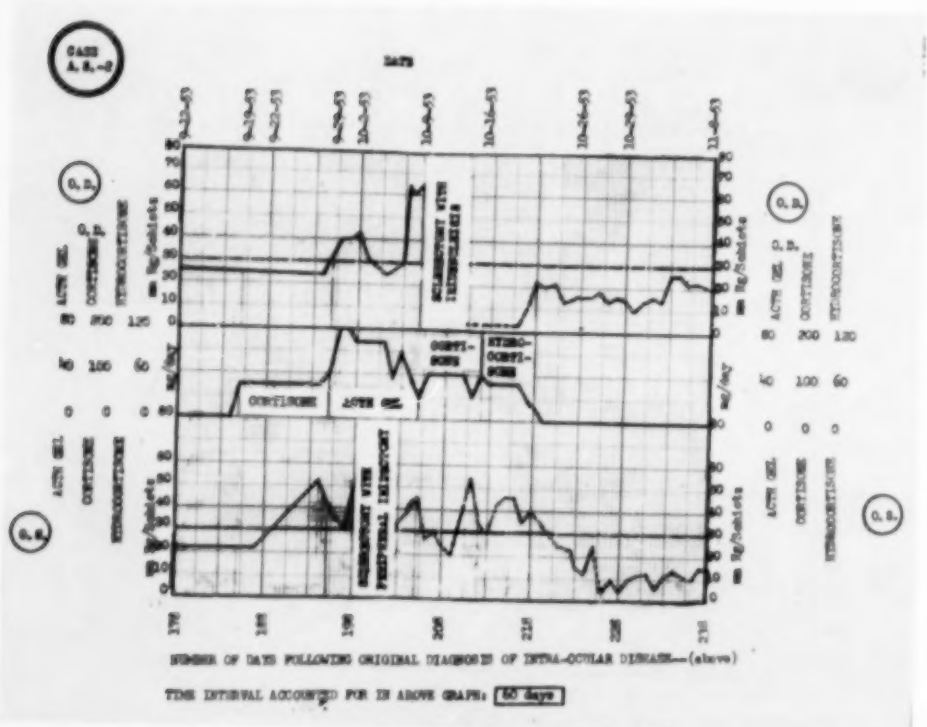

Fig. 2 (Laval and Collier). *Case 1.* Further study of relationship between intraocular pressure and steroid hormone therapy.

no discomfort from the high intraocular pressure.

In the right eye, under cortisone by mouth from April 6th to May 6th, the tension went up from 40 to 70 mm. Hg and gradually came down to 40 mm. Hg after cortisone was discontinued. In the left eye, the tension was 50 mm. Hg when the cortisone was begun and went up to 55 mm. Hg, necessitating a modified Lagrange operation. Thereafter the tension remained normal with or without cortisone.

This patient's graph (fig. 4) shows a definite relationship between the excessive rise of tension in the right eye and the administration of cortisone.

CASE 3

J. C., was a 29-year-old Puerto Rican woman in whom intraocular disease was first diagnosed about nine months ago at which time vision was: O.D., 20/100; O.S., 20/30+3.

O.D. showed large keratic precipitates over the lower half of the cornea; one-plus flare; no cells; no posterior synechias seen; pigmented deposits on the anterior lens capsule; media too hazy to see fundus. O.S., normal.

The patient had been diagnosed as having sarcoidosis in April, 1953. The first and second strengths of tuberculin test were negative. Urinalysis, negative. Blood: 11/5 gm. hemoglobin; 3.87 RBC; slight hypochromia; six percent reticulocytes; 106,000 platelet count; normal white cell count. Chest X-rays showed hilar adenopathy.

From a tension of: O.D., 22 mm. Hg, there was a rise to 44 mm. Hg under ACTH

gel. The drop to 15 mm. Hg was instantaneous when the ACTH gel was discontinued. In the left normal eye, there was no effect on the tension by the ACTH gel. On a later admission, when first cortisone and later hydrocortisone were administered, there was no rise in the tension of the diseased eye and, of course, none in the normal eye.

The relationship between intraocular pressure and steroid therapy in this patient's graphs (figs. 5 and 6) reveals that the cortisone had no effect, but the ACTH gel did elevate the tension in the diseased eye.

Discussion

There are some cases of glaucoma secondary to uveitis in which systemic steroid therapy often dramatically reduces the intraocular pressure; there are other cases in which there is no apparent definite effect. These observations are, however, not related to the particular aspect of the subject which we are here presenting.

ACTH does not reduce the intraocular pressure in cases of primary glaucoma, as has been noted by Blake, Fasanella, and Wong.[4] Furthermore, ACTH does not elevate the intraocular pressure or promote positive provocative glaucoma tests[5] in normal eyes, as observed by Tillett.[7] This is an important factor in the interpretation of the mechanism responsible for the elevation of intraocular pressure in some cases of uveitis receiving ACTH, as observed by us.

Our impression is that systemic steroid hormonal therapy promotes the production

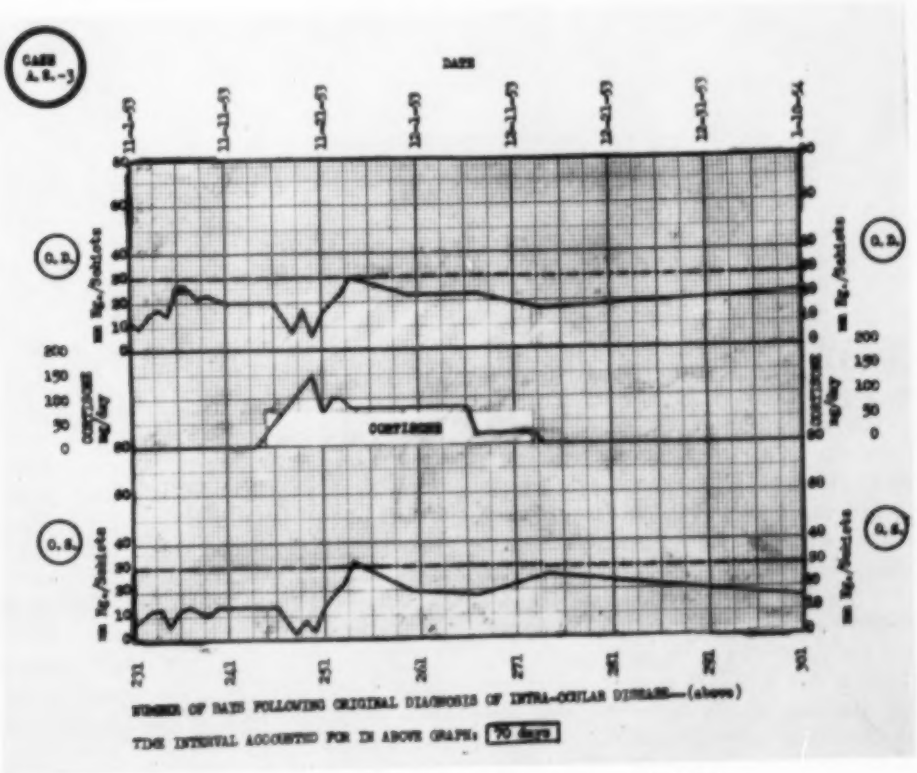

Fig. 3 (Laval and Collier). *Case 1.* Most recent study in Case 1.

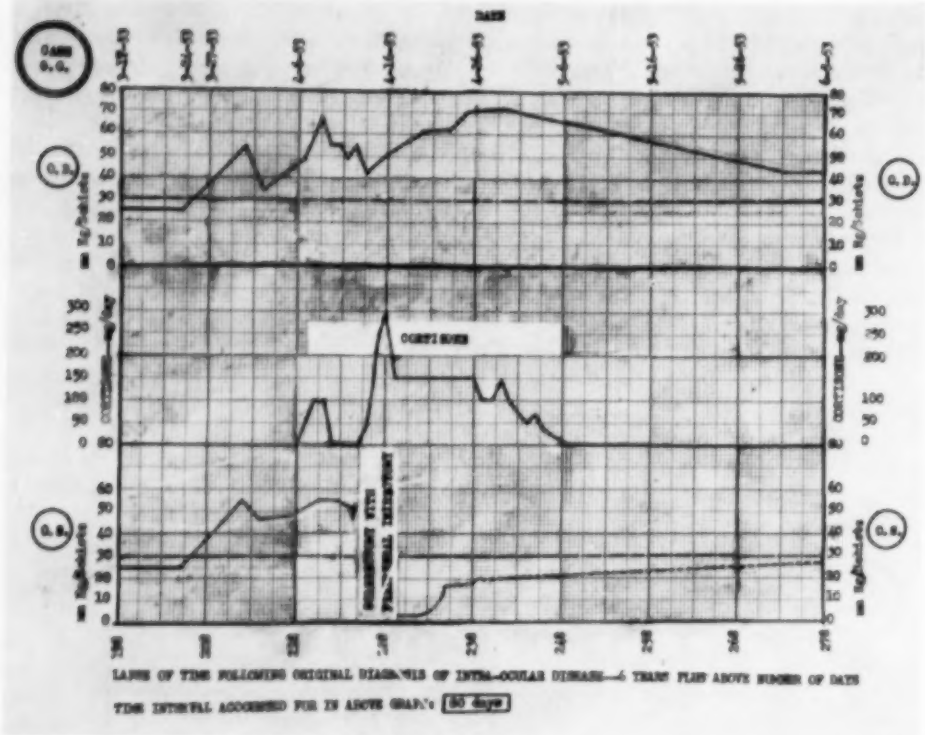

Fig. 4 (Laval and Collier). *Case 2.* Relationship between intraocular pressure and steroid hormone therapy.

of a greater degree of intraocular pressure in those cases that already have changes which hinder the normal drainage of intraocular fluid.

The increased production of intraocular fluid may occur in either or both of the following ways:

1. Systemic steroid therapy may alter the electrolyte balance among the various intraocular fluids and thus cause intraocular fluid retention, just as it causes retention of sodium, and consequently of fluid, throughout the rest of the body. In this connection, the fact that ACTH is more prone to cause salt retention than is cortisone should make one more alert to the possibility of secondary glaucoma in those cases of uveitis treated with ACTH than in those treated with cortisone systemically, as is suggested by our graphs for Cases 1 and 3.

2. Some reduction of the inflammatory reaction, with subsequent improvement of the function of the secretory ciliary processes, may be induced by steroid therapy. In the course of a long-standing chronic uveitis, the ciliary processes sharing in the disease undergo a considerable degree of exhaustion and degeneration, with consequent reduction in the amount of their secretion. This is more apt to be observed in chronic, exhaustive cases, particularly of a granulomatous nature, rather than in acute nongranulomatous cases. In the latter condition the ciliary processes may be in an irritated and hypersecre-

tory stage rather than in an exhaustive and hyposecretory stage. This expectation is also consistent with our observations.

The effect of greater intraocular-fluid production should be more in evidence in those cases having the greatest hindrance to drainage of fluid. This interference would be greatest in the cases having the most mechanical distortion, as by synechias, angular keratic precipitates, exudate of a chronic granulomatous type, or exudate thick enough to have a plugging effect on the avenues of drainage of the intraocular fluid.

Intraocular electrolyte imbalance with sodium retention is not enough to raise the intraocular pressure significantly. This has been shown by the lack of rise of intraocular pressure in normal eyes of patients on steroid hormonal therapy. Even in those patients with chronic simple glaucoma, where drainage of intraocular fluid is hindered, the production of intraocular electrolyte imbalance will not increase the intraocular pressure.

The most plausible conclusion, from consideration of all the foregoing observations, is that there are several contributory factors.

Comment

The uveitis alone was not sufficient to cause the increase in intraocular pressure, as is evidenced in the accompanying graphs by the time-relationship to the systemic steroid hormonal therapy. The greater effect of

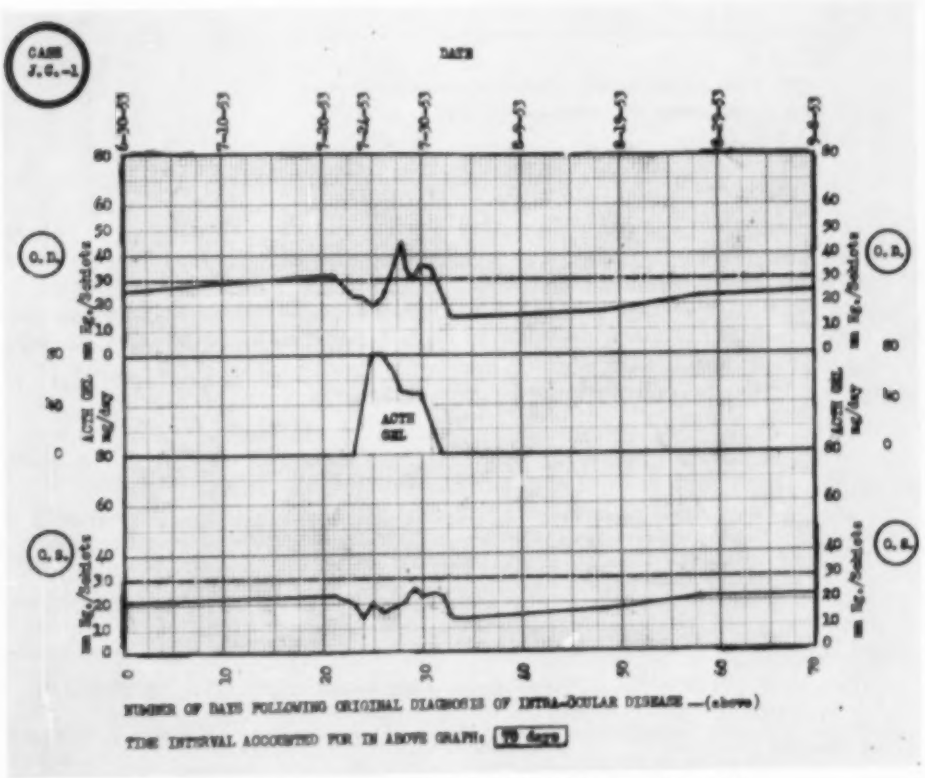

Fig. 5 (Laval and Collier). *Case 3.* Relationship between intraocular pressure and steroid hormone therapy.

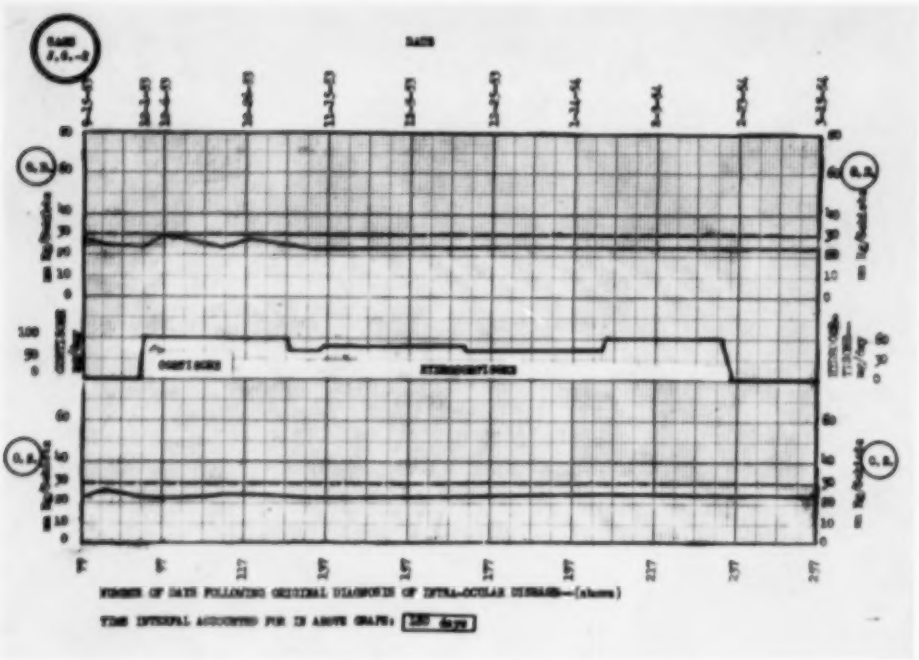

Fig. 6 (Laval and Collier). *Case 3.* Further study in Case 3.

ACTH on the intraocular pressure in all the cases is self-evident.

The advent of Diamox as an adjunct in the treatment of glaucoma raises an interesting point. Perhaps in those patients with uveitis in whom steroid therapy causes an increase in the intraocular pressure, the simultaneous administration of Diamox would reduce the tension to normal limits. Accordingly it would be feasible to get the full benefit of steroid hormonal therapy without the side effect of the secondary glaucoma.

136 East 64th Street (21).

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A NOTE ON THE MANAGEMENT OF RECENT FRACTURES OF THE ZYGOMA INVOLVING FLOOR OF THE ORBIT*

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The zygoma is a prominent and important feature in facial contour. Malposition due to fracture of this bone may eventually result in a marked assymetry of the face and, functionally, because part of the floor and lateral wall of the orbit are formed by the zygoma, may interfere with proper binocular vision.

Trauma, sufficiently severe to cause a fracture in this region, will give rise to considerable edema of the lids and retrobulbar and facial tissues. Because of the edema, fragment displacement may be concealed and the possibility of fracture not even considered.

Not only must the facial bones be X rayed when such injuries occur but careful palpation of the inferior orbital margin must also be performed. A fracture of the orbital floor, which is reported by the radiologist as showing no sign of displacement, may actually reveal a considerable interruption of the orbital margin to the examining finger.

The technique employed for the reduction of those zygomatic fractures herein reported is based on a modification of the usual intrabuccal approach.[1]

The antrum on the affected side is entered as in a typical Caldwell-Luc procedure for radical antrum surgery, except that all the tissues overlying the anterior surface of the maxilla and the zygoma, including the periosteum, are elevated up to the inferior orbital margin.

The advantage of this procedure is that all fracture lines, displaced fragments, and alterations in normal contour of the inferior orbital margin are thus completely exposed.

Care is exerted in this step to avoid injury to the inferior orbital nerve. Fractures into the inferior orbital foramen need cause no alarm so long as the nerve is uninjured.

A portion of the anterior wall of the antrum about two cm. in diameter is next removed. These fractures often involve the surface of the maxilla as well as zygoma so that entrance into the antrum can be gained simply by removing the isolated bone fragments and enlarging the opening with a Kerrison punch. Clotted blood and injured sinus mucous membrane are removed.

Using a dental burr, a small hole is drilled through the most lateral portion of the anterior wall. A No. 20 stainless steel wire is threaded through this opening which actually passes through the zygoma just lateral to the zygomatico-maxillary suture line. About eight inches of wire is teased through with the help of two artery clamps, one inside and one outside the antrum.

Since the malar bone is generally displaced downward and posteriorly, proper reduction is obtained by elevation forward and upward. For this procedure, true mechanical leverage was found to be a more effective method for reducing recent fractures, as well as those in which there had been several weeks' delay.

A medium-sized curved Kelly artery clamp is inserted through a small buccal incision under the arch of the zygoma. Downward pressure over an elevator which acts as a fulcrum and rests against the upper jaw will permit ready and satisfactory reduction (fig. 1). Then by looping the wire around two or three incisor teeth of the upper jaw and twisting the ends firmly together, fixation of the zygoma is obtained (fig. 2).

For additional support to the floor of the orbit, the antrum is firmly packed with vaseline gauze impregnated with sulfathiazole crystals. This gauze is removed two weeks later through a previously made naso-antral

* Presented before the Section for Ophthalmology, New York Academy of Medicine, February 15, 1954.

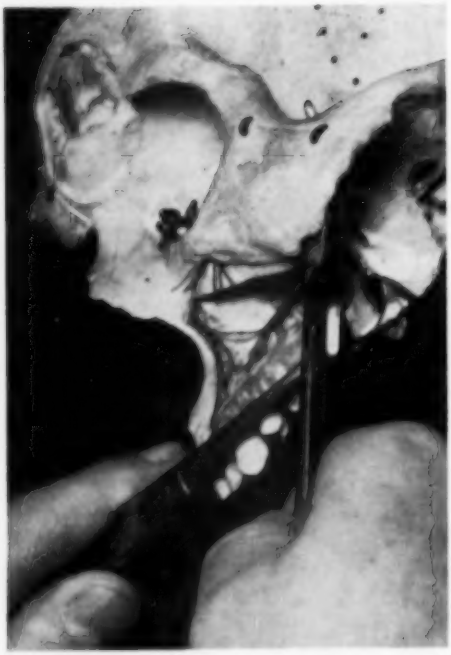

Fig. 1 (Rubin). Application of leverage principle in reduction of fracture of zygoma.

window or, better, directly through the Caldwell-Luc incision. The wire is removed in four weeks.

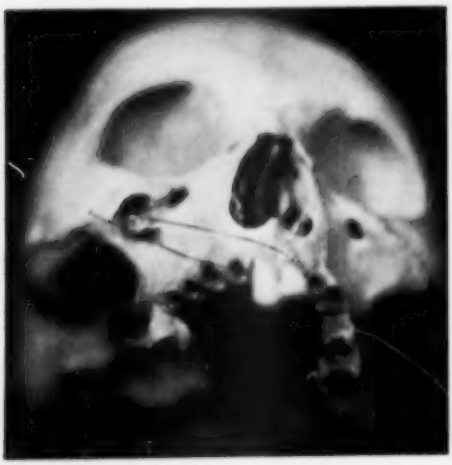

Fig. 2 (Rubin). Wiring of zygoma by looping around upper incisor teeth.

Case reports

Case 1

W. M. was admitted to the New York Eye and Ear Infirmary, June 6, 1952, for an injury to his left zygomatic region. This injury was produced by a blow from the back of the hand of his assailant one week before. Figure 3 shows the X-ray film taken on admission.

Under intravenous pentathol, using intratracheal intubation, a typical Caldwell-Luc incision was made, the antrum entered, and the zygoma elevated into good position.

Since the fracture had occurred 10 days before the operation and some difficulty was experienced in its reduction, it was felt desirable to employ some method which would insure fixation in the proper position. The usual form of external traction using a plaster cap and traction bar had not been planned. It was here, therefore, that some type of direct wiring was first considered to be essential.

Empirically the wire was extended from the zygoma to the upper incisor teeth as previously described. It would hardly be logical to claim that the direction of this wire

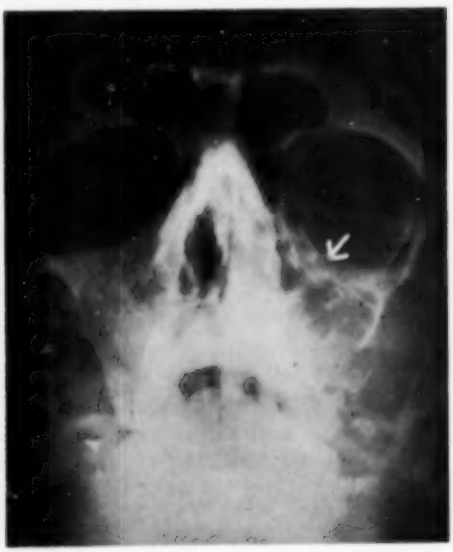

Fig. 3 (Rubin). W. M. Fracture of zygoma.

truly represents the resultant of forces which would be required to hold the fractured mass of bone in proper position. However, it turned out to be entirely successful. It is possible that the mechanical advantage of this type of traction may be based on the unusual articulations and muscle attachments of the zygomatic bone.

A slight amount of purulent discharge from the right antrum was quickly controlled with two instillations of varidase.

CASE 2

C. M., aged 36 years, was involved in a serious highway accident when his trailer truck was overturned. He sustained a fracture of the zygoma and inferior orbital margin of the right eye, in addition to a deep laceration of the face and tears of the choroid with detachment of the retina. Figure 4 shows the fracture before reduction.

An open reduction, as previously described for Case 1, was performed with the assistance of Dr. Marshall Smith on November 22, 1953, at the Middlesex General Hospital in New Brunswick, New Jersey.

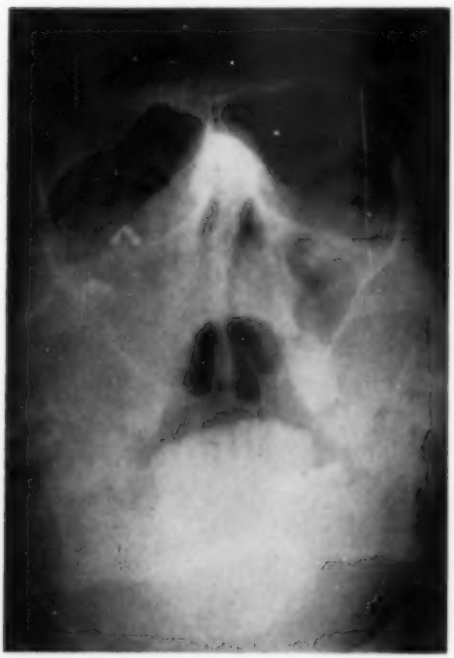

Fig. 4. (Rubin). C. M. Skin clip indicates site of fracture of inferior orbital margin.

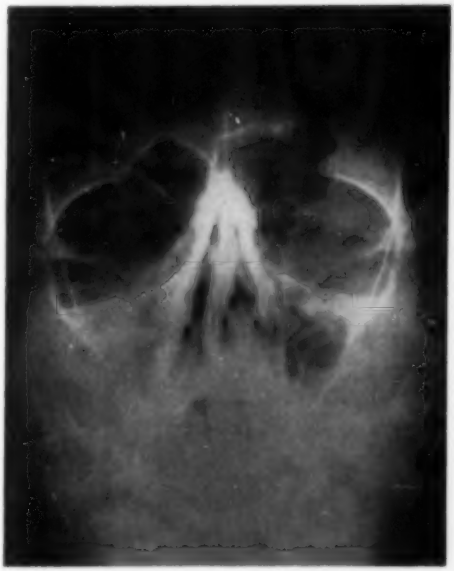

Fig. 5 (Rubin). C. M. Fracture of inferior orbital margin two months after reduction.

In this case, excellent leverage with control was obtained by placing a closed Kelly clamp under the arch of the zygoma and pressing down upon an elevator resting on the upper jaw, as shown in Figure 1. A slight amount of suppuration in the left antrum was readily controlled with one instillation of varidase.

In spite of a detachment of a large sector of the lower retina and the presence of choroidal tears which seemed to involve the macula, 20/30 vision was obtained with preservation of good field by retinopexy on January 10, 1953, at the New York Eye and Ear Infirmary. Figures 5 and 6 show the X-ray film and photograph two months after reduction.

CASE 3

J. T., a college girl, was admitted on November 21, 1953, after an auto accident in

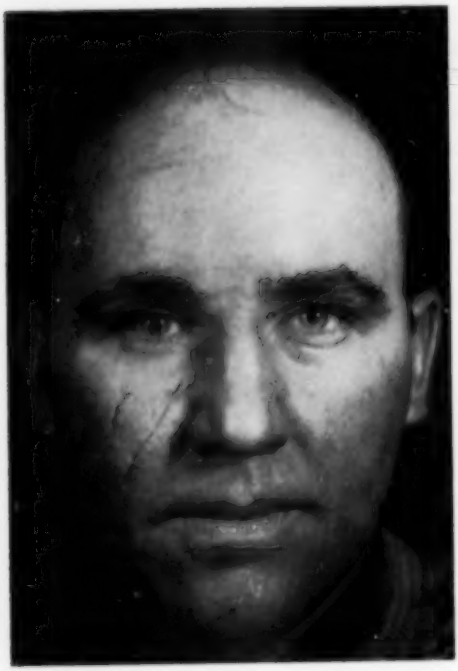

Fig. 6 (Rubin). C. M. Photograph two months after reduction.

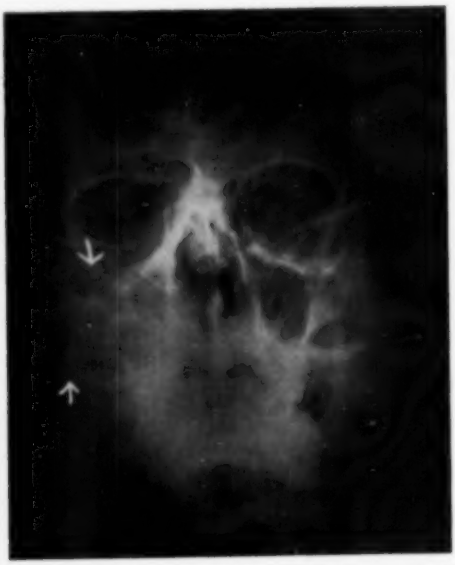

Fig. 7 (Rubin). J. T. Extensive fracture and displacement of temporal portion of the inferior orbital margin. Note position of inferior border of right zygoma.

which she and other college students were injured.

There was marked swelling of the entire left side of the face and much ecchymosis about the lids. Finger palpation revealed an absence of the outer two thirds of the inferior orbital margin. X-ray films confirmed the extensive nature of the fracture and the degree of bone fragmentation as shown in Figure 7.

The usual intraoral open reduction with wiring was performed on November 22, 1953. However, an additional procedure was utilized. To achieve a more perfect approximation of the fragments, direct ligature wiring near the inferior border of the fractured zygoma was employed. Figure 8 shows the position of the fragments and the wires

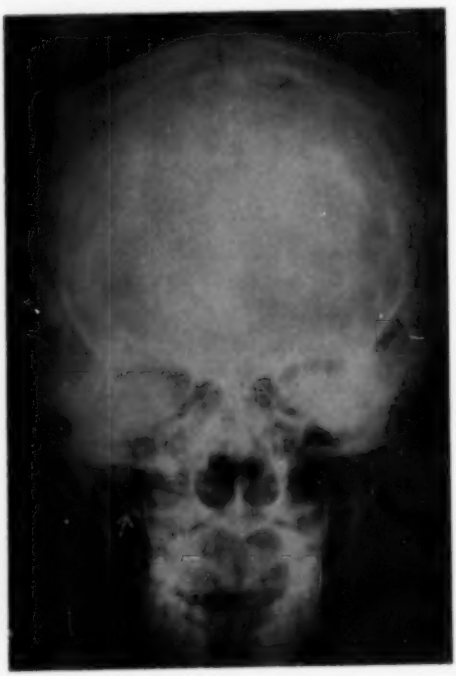

Fig. 8 (Rubin). J. T. Traction wire in position. Arrow points to interosseous wire suture at inferior border of zygoma which corresponds to inferior border of normal zygoma on left.

in situ. Figure 9 is a photograph of the patient two months after the operation. No deformity appears and the horizontal alignment is satisfactory.

CASE 4

G. K., aged 37 years, was injured in a highway accident on March 28, 1953. There was considerable ecchymosis and edema of the right orbital region as well as a fracture of the nose with avulsion of the alar and septal cartilages. Because of the gross nasal distortion, this matter was given first consideration.

The globe itself, except for conjunctival congestion, seemed unharmed. The radiologic report was fracture of inferior orbital margin with no displacement of fragments (fig. 10). The fracture was not reduced.

Even after most of the edema had disappeared there seemed to be no change in the position of the globe, no diplopia in any position of gaze, and no significant hypophoria. However, as time went on, the hypophoria became more and more marked and ptosis of the right eyeball more apparent.

Fig. 9 (Rubin). J. T. Photograph two months after reduction of fracture of inferior orbital margin.

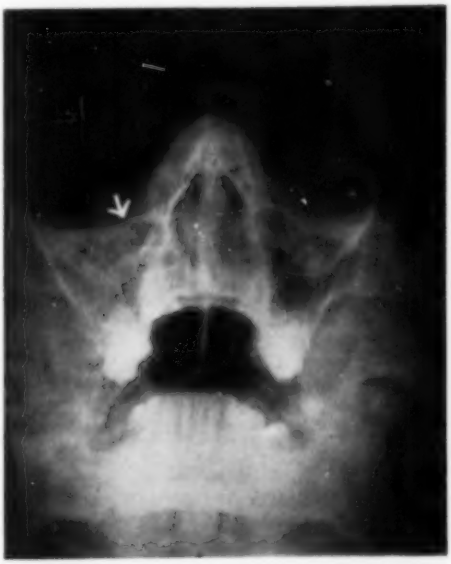

Fig. 10 (Rubin). G. K. Arrow points to fracture of inferior orbital margin, incorrectly interpreted as causing only negligible displacement of fragments.

Three months after the injury there was a hypophoria of 14 prism diopters at six meters and seven prism diopters at 25 centimeters. This case required a bone graft along the floor of the right orbit for suitable correction.

With the assistance and supervision of Dr. Byron Smith, a wedge-shaped segment of cancellous bone, about 2.0 by 3.5 by 0.3 cm., was removed from the left iliac crest and inserted under the periosteum of the floor of the orbit. A depression of the right cheek area was also corrected by bone graft to the right anterior maxillary wall. Figures 11 and 12 show the photographs before and after bone grafting, according to the method of Converse and Smith.[2]

At the last examination, two months after the operation, a residual hypophoria of seven prism diopters at 25 centimeters and eight prism diopters at six meters was found. However, this patient has fusion in all fields of gaze and is comfortable without prismatic correction.

Fig. 11 (Rubin). G. K. Photograph three months after injury. Fracture unreduced. Note ptosis of right eyeball.

Fig. 12 (Rubin). G. K. Photograph two months after subperiosteal bone graft to floor of orbit.

Summary

Recent fractures of the zygoma involving the inferior orbital margin should be suspected where there is much periorbital edema. Careful finger palpation and X-ray studies will confirm suspicions. Later, hypophoria or hypotropia, and enophthalmos with ptosis of the globe make the diagnosis obvious.

Early fractures are treated successfully by intrabuccal exposure of the fracture, followed by reduction with controlled leverage and wiring to upper incisor teeth as described.

After firm union, a correction of deformities from unreduced fractures in this region may be satisfactorily obtained by a subperiosteal bone graft along the floor of the orbit.

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NEW OPERATIONS AND SOME SPECIAL INDICATIONS AND TECHNIQUES IN OPHTHALMIC SURGERY*

(Corepraxy; Congenital ectopia of the lens; Prophylactic operation for detachment; Diathermy in recurrent hemorrhages in young people—Eales' disease)

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There are certain operations which, in my opinion, have an interest from the practical point of view and which do not appear in the usual list of surgical operations of the eye.

These operations do not present any particular technical difficulties. On the contrary, they are relatively simple. It is more the questions of the indications for using the operations that give rise to discussion. Taking our experience as a basis, I can say that these operations have proved their worth and that they can today be recommended to ophthalmologists, although some of them need precise indications calling for considerable professional conscience on the part of the surgeon who performs the operation.

Corepraxy

Quite a number of operations for the purpose of restoring a central pupil have been described since the very beginning of ophthalmic surgery until recent years.

As a rule, the pathologic location of the iris aperture is the consequence of a more or less successful attempt to operate on the cataractous lens. It may occur as well after extracapsular operations as after the more modern intracapsular extractions, whenever there is an iris prolapse, a loss of vitreous, a severe postoperative hemorrhage, and also in eyes where inflammatory processes or secondary glaucoma take place after a perfect surgical intervention.

Frequently the displaced pupil is simultaneously obstructed by remnants of the incompletely removed lens, by organized hemorrhages, or by an exudative membrane.

This complication is also encountered after discissions of congenital cataracts and especially after extraction of a complicated cataract following chronic iridocyclitis, diabetes, or previously operated glaucoma.

Furthermore, the pupil can sometimes be displaced in cases where the lens is still intact and in its normal position, such as after perforating injuries or ulcers of the cornea or, as in two of our cases, in congenital glaucoma.

Lastly, the pupil can be in the normal place but reduced to a slit and obstructed by a thickened membrane.

The surgical treatments for these cases that have been recommended are simple iridotomy (Meller), iridocapsulotomy or capsulectomy (de Wecker, Elschnig) with scissors or with a punching instrument, or, as described by Blaskovicz, by a cicatricectomy. But all these operations cannot be performed without the use of a rather large instrument which has to be introduced into the anterior chamber of the eye and therefore requires a large opening of the latter.

The consequence is that in most cases some loss of vitreous occurs and some blood falls into the anterior chamber reducing the chances of a successful operation in many cases. Besides these immediate complications, the operation may be followed by hyper- or, more often, hypotension of the globe, even ending, not infrequently, in phthisis bulbi. For all these reasons no eye surgeon is very fond of them. In 1939[1] I described a new

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technique of making an artificial pupil, to which I gave the name of corepraxy.

Looking for a new technique, I was conscious that three essential points had to be taken into consideration: (1) Avoiding an incision in the region of the old scar, (2) avoiding loss of vitreous, (3) avoiding hemorrhages which as a rule obstruct the newly formed pupil.

The main advantage of corepraxy is its simplicity and its relative innocuity.

The surgical procedure is:

The patient is prepared as usual. The importance of previous administration of antihemorrhagic medication (calcium, ascorbic acid and, intravenously, naphthionine, and so forth) should be particularly observed. When the pupil is much displaced and closed by a secondary membrane, neosynephrine (10 percent) or Glaucosan is instilled an hour before, one drop every 10 minutes for three doses. The local anesthetic is completed by a retrobulbar injection of novocaine-adrenaline (or Xylocaine®).

With a very small keratotome a 1.5 to 2.0-mm. large incision is made near the opposite side of the aberrant pupil, generally at the 5- or 7-o'clock position when the ectopic pupil is at the 12-o'clock position. Through this aperture a small blunt hook is introduced and brought in front of the displaced pupillary area. There it must be turned 90 degrees on its axis so as to engage the edge of the iris. The hook is then cautiously pulled down to the incision exposing the iris which is cut close to the hook with Wecker's scissors (fig. 1). Sometimes, the iris tissue being atrophic, it is torn by the instrument before the incision can be made, but even then a fairly satisfactory pupil can be obtained if this maneuver is repeated two or three times.

Since the resistance of this atrophic tissue is evidently reduced, the traction exerted on the ciliary body and ora serrata is only slight, so that the risk of hemorrhage is also small. As a rule, one obtains an oval-shaped pupil.

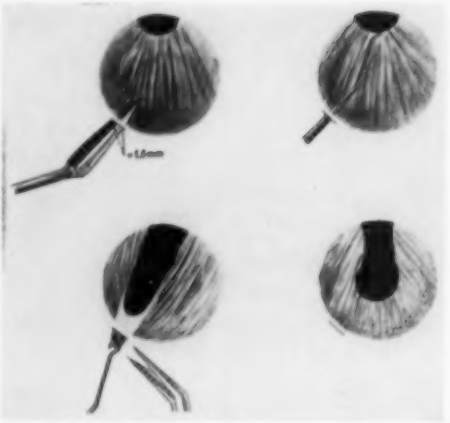

Fig. 1 (Franceschetti). Corepraxy. (Upper left) Corneal incision. (Upper right) The hook is brought in front of the displaced pupil. (Lower left) The iris is exposed and cut close to the hook. (Lower right) The final result.

However, when the iris is not atrophic, for example, in young patients or in posttraumatic cases, it may happen that the corepraxy gives only a pupillary slit in the oblique direction of the traction exerted by the hook. In these cases, another incision has later to be made at the limbus, allowing us to draw the iris down in a direction perpendicular to the former.

More recently[2] I have arrived at a combined double symmetrical and simultaneous surgical procedure. Two corneal incisions are made, one at the 5- and the other at the 7-o'clock position, either simultaneously or immediately following each other. Usually the second incision is made by the assistant but, even if it is not made immediately, there is no difficulty since practically no aqueous is spilled if the incision is done correctly (fig. 2).

At present we operate in practically all cases by making a double incision. Not only is it easier to obtain a well-formed pupil, but the traction on the iris is less than when the incision is made directly away from the displaced pupil. It is then sectioned, as already stated.

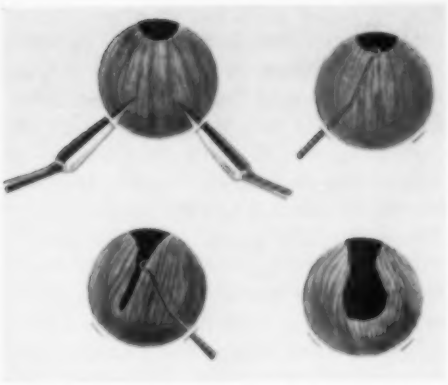

Fig. 2 (Franceschetti). Modified corepraxy. (Upper left) Simultaneous corneal incision. (Upper right) The hook is brought in front of the displaced pupil. (Lower left) The iris having been cut, the hook is introduced through the second incision. (Lower right) The final result.

The hook is introduced through the first and afterward through the second incision and the iris drawn down and out.

In 1951,[3] my statistics amounted to 84 cases and today I have reports of 114 corepraxies performed. Eighteen cases have not been taken into consideration, being for various reasons not suitable for comparison.

Of the other 96 cases, there were: 44 cases after operation for senile and presenile cataract; nine cases after congenital cataract; 28 cases after complicated cataract; 13 cases of traumatic cataract; two cases of corectopy without cataract.

The visual acuity obtained after the corepraxy naturally depends on the state of the vitreous and the fundus. In spite of the frequency of more or less significant vitreous opacities in 51 of 96 cases, the visual acuity obtained after corepraxy was as good as 2/20 to 20/20. This result means that more than 50 percent of our cases have been able to regain a useful degree of vision. We feel that no other technique could have given us so many satisfactory results. I want to stress the fact that even in the most difficult cases none were encountered in which the eye condition was made worse through the operation, no eye ended in phthisis, although some of them already had a low tension before the intervention.

Indeed, hypotension is no contraindication as the tension may become even better after a certain time.

In none of the 96 cases did we encounter a secondary detachment of the retina. This illustrates the fact that the not infrequent detachment occurring after discission or extraction of secondary cataract is not due to the traction on the iris, but to that exerted on the ciliary body and ora serrata by the membrane itself.

For that reason we prefer to make first a corepraxy in cases where the pupil, obstructed by a membranous secondary cataract, is narrowed but not significantly displaced.

In fact, it is often surprising to see that in cases with dislocated or obstructed pupils the membrane behind the excised iris is absent or much less important than had been expected, so that it is much easier to perform a later discission.

In cases of displaced pupil with moderate hypertension, I prefer to do the corepraxy first (after retrobulbar injection of alcohol 24 hours before) as in several cases the hypertension has subsequently disappeared.

After the operation we instill a drop of scopolamine and generally inject subconjunctivally 0.2 to 0.3 cm.^{3} of 2.5-percent cortisone. The dressing can be removed after 24 to 48 hours.

Corepraxy is the only safe operation; it may be used even when only one eye remains.

Operation in congenital ectopia of the lens

Another problem I should like to discuss is that of the operation in congenital ectopia of the lens.

In 1942 Zeeman,[4] of Amsterdam, in his important paper on congenital ectopia of the lens, emphasized that the textbooks on ophthalmology give contradictory advice con-

cerning the operation for this affection and often even fail to mention congenital ectopia of the lens.

Iridectomy has been particularly recommended by American authors, such as Clapp[5] (1934), Clarke[6] (1939), Bellows[7] (1944), Kirby[8] (1936), Spaeth[9] (1948), but we know that the results are never very satisfying as the operation is frequently indicated when the edge of the lens goes through the pupil, producing diplopia. For that reason, the iridectomy does not eliminate the subjective troubles, although the vision through the aphakic part may be improved.

Nearly all the authors agree that the extraction of the lens is dangerous and that the loss of vitreous and other complications are frequent. Duke-Elder[10] speaks of it without enthusiasm.

The different authors emphasize that needling is less dangerous, but the resorption of the masses is unsatisfying.

From my personal experience, two-knife needling is the less dangerous operation in these cases and gives excellent results.

Bowman,[11] in 1852, was the first to introduce simultaneously two needles into the anterior chamber, but he did it for the operation of secondary cataract. It is difficult to say who was the first to apply this method for the operation of the ectopic lens. According to Elschnig[12] the merit goes to Zion who applied this method in 1899. My teacher Haab[13] wrote in 1920 that the operation with two needles permits one to obtain, surely but slowly, excellent results. Among the authors recommending this technique, may be mentioned Knapp[14] (1941), Zeeman[4] (1942), Stallard[15] (1946), and Duverger, Velter, and Brégeat[16] (1950).

Recently Kirby[17] (1950) changed his ideas and stipulated that the two-needle discission is excellent, but he also takes into consideration extraction by forceps or by the loop.

Duke-Elder[10] states that the double needling is very often difficult and that absorption of the lens masses is unsatisfying. He suggests rather extraction after preparatory iridectomy.

The great danger of extraction is phthisis bulbi. I agree with Zeeman[4] that two-knife needling is not only useful, but really the method.

According to Stallard[15] a single intervention should generally be sufficient. In fact, he penetrates, if possible, with one needle, deeply into the lens.

Personally, I prefer to make a less extended discission since the operation can be repeated without danger. On the other hand, we know that the ectopic lens is generally surrounded by vitreous, so that a single discission does not allow one to obtain satisfactory resorption.

As it is difficult to enter simultaneously with two linear needles, Grieshaber has made for me a needle with a handle inclined 145 degrees for entering on the nasal side. Stallard[15] also uses a similar instrument with an inclination of 135 degrees.

The needles have inclined handles. One is similar to the needle of Bowman and fixes the lens and if possible, pulls it toward the anterior chamber. The other resembles Kuhnt's double-cutting knife and permits the up-and-down movements for the discission. While the assistant fixes the globe, both instruments are simultaneously introduced.

The operation can be repeated every two to three weeks. On these occasions we try to displace a part of the more or less opacified and shrunken lens into the anterior chamber, where the resorption of lens masses is much quicker.

Of the seven patients operated on, four had the syndrome of Marfan (arachnodactyly), one a syndrome of Marchesani with spherophakia, and two corresponded to ectopia caused by a recessive gene, with consanguinity of the parents but without general constitutional manifestations.

In the 13 eyes of the seven patients operated (one eye had a phthisis bulbi after extraction of the cataract), the visual result

was excellent. The number of operations necessary to obtain a free pupil varied between two and five for each eye. Two patients were respectively 30 and 38 years of age and the operation presented no more difficulty than in younger people.

This can be explained by the fact that the ectopic lens is separated from the iris by vitreous tissue, so that we do not observe the secondary vascularization of the lens masses as we do when we do a needling in ordinary cataract of adult patients. In the first case operated on, one eye developed a detachment of the retina six years later. Although spontaneous detachment in ectopia lentis due to arachnodactyly occurs in about 10 percent of all cases (Zeeman[4]), this was the only eye in which we punctured the masses in the anterior chamber after the needling. We had the good luck that the operation of this detachment gave a good result with 6/10 vision.

Nevertheless, a large keratome incision in ectopic lenses is dangerous not only with regard to a secondary detachment, but also on account of the great sensitivity of eyes with ectopic lenses. Even a small incision may give rise to a lasting irritation, sometimes with deep local vascularization and even definitive hypotonia.

The possibility of operating the ectopic lens practically without danger is not only important in view of a considerable amelioration of the vision (8/10 to 10/10 of vision in all cases of Marfan's syndrome, as they have no myopia, and 3/10 to 8/10 of vision in the other cases generally associated with high axial myopia), but also in view of the frequency of late spontaneous complications.

In fact, the subluxation and above all the secondary complete luxation frequently produces secondary glaucoma which has in these cases a rather bad prognosis. The danger of spontaneous detachment has already been mentioned. Ophthalmoscopy may present great difficulty because of the subluxated, often opacified, lens and the usual difficulty in obtaining sufficient dilatation of the pupil.

In another case with complete spontaneous luxation of the lens in the vitreous, the results of an operation of detachment was as successful as in the case mentioned before.

It seems, therefore, that the prognosis for detachment in congenital ectopic lens is not so bad to face, if we have the opportunity of discovering the retinal hole through the aphakic pupil.

With regard to the freedom from complications of the operation and the excellent results obtained, I expressed the idea that it would be indicated to operate all cases of congenital ectopic lens if the vision is insufficient or when the subluxation of the lens has a tendency to progress. Recently Duverger, Velter, and Brégeat[16] (1950) arrived at the same conclusions, especially with regard to the danger of secondary glaucoma.

Today the eye surgeon has not only to deal with technical questions, but also, as is shown by the example of ectopic lens, with the problem of prophylactic operations.

Prophylactic operation for detachment of the retina

It is to the credit of Gonin that he has shown that tears in the retina play an essential role in the pathogenesis of retinal detachment and that the closure of retinal tears and holes is the most important procedure in the treatment of that condition.

In spite of the technical progress made in the field of operations for retinal detachment, there are always a certain number of cases giving an unsatisfactory result. This is true not only for those operated in the advanced state, but even for certain recent cases in which, a priori, the prognosis seems to be favorable. The problem of the prophylactic operation for detachment is therefore always of great concern.

Let us first discuss the question of *retinal tears without detachment*.

I may recall that Vogt[19] advised against any intervention, considering that it was

always time enough to have recourse to an operation if the retinal detachment occurred afterward. Nevertheless, he mentions some cases where he operated on retinal holes in spite of the absence of a real detachment. Several authors have observed tears of the retina for many years without secondary detachment; on the other hand, others have seen retinal holes considered as latent which, after some weeks or months, produced an important detachment.

I agree with Jess,[19] Lindner,[20] and others that an early intervention has the maximum chance of success and at the same time a minimum of risk. Ourgaud and Bérard[21] stress with reason that it is dangerous to expect a spontaneous chorioretinal adhesion, since sooner or later we may be obliged to interfere for a secondary detachment in less favorable conditions. Hoping for a spontaneous recovery is certainly more dangerous than operating at the first onset of a tear.

At the meeting of the French Ophthalmological Society in 1950 the paper of Mrs. Sédan-Bauby[22] gave rise to a controversy. She had observed a case which had presented for three years a retinal tear without detachment. A diathermic coagulation was immediately followed by a detachment. In the discussion Renard, Sobhy Bey, Dollfus, and others declared themselves against the prophylactic operation, while Arruga and Schepens defended the opposite point of view.

We must explain in detail that Mrs. Sédan-Bauby had made not only a superficial coagulation but also two perforating diathermic punctures. Yet, there is no reason to make a perforating coagulation when the retina is not detached. A local superficial diathermic coagulation is quite sufficient, and the intensity of surface coagulation must be very low in order to obtain a slightly yellowish color of the sclera and not parchmentlike areas. Personally I have operated on eight cases of retinal tears without detachment. Six of them had a detachment on the other eye before. In all these cases we made a surface coagulation in the region of the hole without any early or late complications.

Much more difficult is the problem of the *prophylactic operation for detachment without visible tear.*

One cannot insist enough on thorough examination of the whole periphery of the second eye when the first has presented a detachment. I have been surprised by the fact that in a great number of those cases one can find in clinically normal eyes either tears without detachment or frequently even zones of peripheral retinal degeneration. In general they are localized in the equatorial region or between it and the ora serrata.

They may present different aspects: incomplete retinal separation (retinoschisis), grayish zone of retinal atrophy with cystoid degeneration, obliteration of the small terminal vessels, whitish arcades and palisades with displacement of pigment and sometimes small hemorrhages. Not infrequently they are bordered by chorioretinal lesions forming a more or less complete barrage. Very often there are no subjective symptoms and no alterations of the visual field.

The examination of the external periphery of the fundus is facilitated today, thanks to the three-mirror contact glass of Goldmann. The three mirrors have different inclinations and so it is possible to examine stereoscopically with the slitlamp a very large peripheral region.

Since 1931, Sourdille,[23] Jess,[19] Arruga,[24] and others have suggested cauterizing the sclera in the region of retinal degeneration if the other eye presents a detachment. Personally, I am also convinced that the prophylactic operation has a great importance and that it is even necessary to enlarge its indication. Till now I have operated 17 patients presenting zones of equatorial degeneration in the second eye and three cases where the alterations were present in the first eye accompanied by subjective symptoms.

Theoretically, it would be sufficient to

make a coagulation in the zone of degeneration. However, it may be necessary to reoperate if other zones in the neighborhood are affected.

For that reason I prefer to cauterize the whole quadrant presenting the lesions between 12 and 13 mm. from the limbus. If the lesions are situated in the upper half of the periphery, I even intervene on both upper quadrants.

The cauterization has to be done very carefully and the electrode has to be passed rapidly on the sclera in order to obtain hardly visible coagulation without any retraction. Concerning the indication for the prophylactic operation, we have to take into consideration two eventualities:

1. *Operation of the second eye when the first is affected by detachment.* In my opinion, the prophylactic operation is indicated in the following cases:

a. Presence of subjective symptoms such as photopsia continually localized in the same sector.

b. Presence of important degenerative alterations, especially in the upper half of the periphery.

c. Presence of slight cystoid alterations in younger subjects. It is well known that the bilateral detachment is most frequent between 20 and 30 years of age.

d. As a matter of principle, I do not operate the cataract of the second eye if the first has had a nontraumatic detachment without making a prophylactic barrage in the two upper quadrants. Everyone knows the frequency of detachment after cataract extraction when the first eye has been affected and the rather bad prognosis of detachment in aphakic eyes. Naturally we can discuss the question as to whether it would not be better to cauterize the four quadrants successively. In my opinion it is sufficient to operate on the upper half as the inferior detachment is rarer, has a much better prognosis, and can in general be cured or stopped by a barrage.

e. The prophylactic operation may exceptionally be indicated in cases in which the examination of the periphery of the second eye is very difficult or nearly impossible.

This is particularly important in young people, where bilateral detachment is frequent.

The first case I operated for that reason was that of a man, aged 33 years, who presented ectopic pupils and lenses in both eyes and had lost the first eye by a spontaneous detachment. As it was impossible to dilate the pupil of the second eye, I decided to make a prophylactic diathermic coagulation of the upper half of the eye. I should emphasize that the prophylactic cauterization at 12 to 13 mm. from the limbus has practically no effect on the limits of the visual field.

2. *Prophylactic operation of the first eye.* As regards the indication of a prophylactic operation of the first eye, it is natural that we should propose the operation only in the presence of marked subjective symptoms and really suspected retinal degeneration. Furthermore, the age of the patient, the presence of high myopia, and the hereditary disposition have to be taken into consideration. Taking into account the innocuity of the prophylactic diathermic coagulation, we have been induced to apply this method to those conditions which even today have a rather bad prognosis.

Recurrent retinal hemorrhages in young people, or Eales' disease

In 1882 Eales found that recurrent retinal and vitreous hemorrhages in the young were connected with changes in the retinal veins. The relation between the recurrent hemorrhages and tuberculous periphlebitis was established clinically by Axenfeld and Stock[25] in 1911. The finding of tubercle bacilli by Gilbert[26] (1935) and the histologic studies of Fleischer[27] (1914), von Hippel[28] (1935), and others have added their weight of evidence as to the tuberculous etiology of

this disease. A frequently positive tuberculin test agrees with such an etiology.

In 1934, Marchesani[29] proposed a new explanation for the occurrence of retinal perivasculitis. He assumed these changes to be due to a localized manifestation of thromboangiitis obliterans, or Buerger's disease. He did not consider the anatomic findings of Fleischer and others to be sufficient proof that the disease is due to tuberculosis.

I agree with Elwyn[30] that Marchesani's arguments are not convincing and that the greater number of cases do have a tuberculous etiology, although there is a possibility that some cases might be due to a different cause. Certain observers incriminate parasites such as ascarides as playing a role in the etiology of recurrent hemorrhages, while others taking into account the predominance of the affection in males think of endocrine disorders.

In his textbook Duke-Elder[31] confirms that the treatment of Eales' disease is always difficult and mostly unsatisfactory. Many ophthalmologists rightly object to the use of tuberculin in retinal periphlebitis for fear of inducing fresh hemorrhages. According to my experience, treatment by rest in the mountains with appropriate systemic treatment (calcium, vitamin C, antihemorrhagics: rutin, vitamin K, and so forth) under the control of an oculist, as is done in Switzerland at Davos, allows us to obtain an amelioration in cases which have no tendency to spontaneous resorption of the hemorrhages in the vitreous.

From the therapeutic point of view the most important fact would be to prevent new hemorrhages as we know that in the course of time they give rise to connective-tissue formation in the retina and the vitreous. In the end this retinitis proliferans may definitively destroy the visual acuity.

Since 1946, I have tried to prevent recurrent hemorrhages and their disastrous consequences by superficial coagulation of the zones presenting vascular alterations and local hemorrhages. Having so far operated eight cases, I can assert that diathermocoagulation has much improved the prognosis of that affection.

In the literature I have found only one similar observation communicated by Verhoeff.[32] A young man, aged 22 years, had lost one eye by massive hemorrhages of the vitreous, the other presented numerous foci of retinal periphlebitis. In the course of one year, Verhoeff made three interventions cauterizing the whole periphery of the fundus. The central vision remained good but the visual field was considerably constricted.

Of my eight cases, in five the operation was performed on the second eye, the first having been lost through previous hemorrhages. Only in one case did I have the opportunity of operating on both eyes. I would like to give you some details of two of my cases.

The first one concerns a physician, aged 42 years, who for six years had presented recurring hemorrhages in both eyes. Every three months the patient had a new hemorrhage and was obliged to give up his professional activity.

In the left eye the vision was reduced to light perception as a consequence of organized hemorrhages of the vitreous. In the right eye the vision was 20/20 with correction of his myopia, but the retina in the nasal part and in the lower temporal quadrant presented at the periphery an extensive periphlebitis with perivascular sheaths, numerous hemmorrhages, and degenerative lesions.

I made two successive diathermic coagulations, first on the nasal side between the 12- and 5-o'clock positions and the second time between the 6- and 9-o'clock positions. The vision remained normal and the slight constriction of the visual field, corresponding to the cauterized zone, has practically no importance. For more than two years the patient has had no other hemorrhage and has been able to resume his professional duties.

The second case is one of a boy aged 15 years, suffering from recurring hemorrhages of the vitreous of the left eye, showing no tendency to clear up for several years. In the right eye, considered as normal, I discovered at the periphery of the lower nasal quadrant a typical peripheral periphlebitis which was cauterized. In the left eye, in spite of the vitreous hemorrhage, I was just able to find a suspect zone on the nasal side. After coagulation of that region, I was surprised to see a complete clearing up of the vitreous. For three years the vitreous has been absolutely clear, the visual field is quite normal, but the central vision is reduced to 1/10 because of retinal scars in the macular region.

It should be emphasized that three of the five cases, of which I have operated the second eye, had no subjective symptoms of the peripheral periphlebitis. This fact shows the great importance of accurate examination of the second eye when recurring hemorrhages are found in the first eye. I am convinced that not only the therapeutic but above all the prophylactic coagulation of retinal periphlebitis will help us to make in the future a better prognosis of this serious disease.

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INJECTION OF HYALURONIDASE INTO THE ANTERIOR CHAMBER OF THE RABBIT EYE*

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PART I

Since the isolation of hyaluronidase from bovine vitreous in 1934, various ophthalmologic uses for this preparation have been suggested. Akinesia[1] as produced by either the O'Brien or Van Lint method has been found to be more rapid, certain, and profound when hyaluronidase is added to the procaine-epinephrine combination. In surgical procedures in which retrobulbar anesthesia[2] is to be used, particularly in cases where a lowering of the intraocular pressure is desired, the addition of hyaluronidase has been helpful. It has also been incorporated[3] in retrobulbar injection to reduce the ocular pressure in acute glaucoma. Retrobulbar injection of hyaluronidase has been recommended to reduce the edema of the orbital tissues associated with thyrotropic exophthalmos.[3]

Hyaluronidase has been used subconjunctivally[2] to reduce hypopyon associated with corneal ulcers and to increase the penetration and absorption of antibiotics administered subconjunctivally. It also has been of value[2] when added to the subconjunctival injection of cocaine-epinephrine and atropine for the releasing of posterior synechias.

It has been suggested[2] that following inadequate filtering operations for glaucoma subconjunctival injections of five-150 turbidity-reducing units may increase the efficiency of drainage. Transient and variable improvement has been reported[2] from subconjunctival administration of hyaluronidase in attempts to clear corneal edema, scars, opacities, and blood vessels.

Tassman[4] found that 150 turbidity units of hyaluronidase instilled into the conjunctival sac produces almost immediate improvement in patients with postoperative chemosis and edema of the conjunctiva persisting after cataract extraction. He further observed that in cases of postoperative chemosis and orbital edema which occasionally occur after enucleation, an injection of 150 turbidity reducing units reduces the chemosis and edema almost immediately. Tassman reported that in five patients with orbital hemorrhage due to traumatism, a retrobulbar injection of procaine-epinephrine containing 100 turbidity-reducing units of hyaluronidase administered on two successive days produced rapid absorption and disappearance of the hemorrhage.

In a series of 28 patients with early pterygia, Carriker[5] found that injection of hyaluronidase caused resolution of the growth if the apex of the pterygium had not progressed more than one mm. over the cornea.

Instillation of hyaluronidase into the anterior chamber of the eye has been reported by Linn and Ozment.[6] According to these workers, this procedure produced iritis, clouding of the cornea, and keratectasia in the rabbit eye. A review of their work in this capacity is as follows:

> Hyaluronidase was injected into the anterior chamber of 16 normal rabbits in order to determine its effect on the intraocular pressure of the normal eye. The fellow eye of each rabbit was injected with physiologic saline. Observation for a period of 72 hours failed to reveal any significant effect on the intraocular pressure of these rabbits.
>
> Concurrently, clinical studies were made by these authors of the effect of instillation of hyaluronidase into the anterior chamber of two patients with secondary glaucoma: The first patient, a 49-year-old woman, had acute nongranulomatous uveitis and secondary glaucoma with an intraocular pressure of 66 mm. Hg (Schiøtz). An original anterior chamber paracentesis was reopened daily for six days. Within 24 hours after each reopening the tension would return to 62 to 66 mm. Hg. On the seventh day the anterior chamber was irrigated with a freshly prepared solution of hyaluronidase containing one turbidity reducing unit per cc. On the following day the tension had risen again to 49

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mm. Hg. Irrigation with hyaluronidase was again performed after allowing the aqueous to escape. The tension after the second instillation of the enzyme was 36 mm. Hg (Schiötz). A subsequent irrigation with hyaluronidase three days later failed to produce the same reduction of tension and no further irrigations were performed. The uveitis subsided a few days thereafter.

An anterior chamber paracentesis was performed in a second patient with a similar condition. The paracentesis was reopened daily for four days but tension returned to a high level after each opening. An ocular tension of 77 mm. Hg (Schiötz) was present on the fourth day. On the fifth day reopening of the paracentesis was accompanied by irrigation of the anterior chamber with a freshly prepared solution of hyaluronidase containing one turbidity unit per cc. The tension was normal 24 hours later, but rose again to 72 mm. Hg in 48 hours. Aqueous was again allowed to escape and irrigation with hyaluronidase was repeated. This time the tension remained normal for six days without subsequent opening of the corneal incision.

Linn and Ozment felt that hyaluronidase had exerted a definite beneficial action on intraocular pressure in both of these patients. To determine the possibility of damage to the tissue of the iris, additional rabbit experimentation was performed by these investigators:

A freshly prepared solution of hyaluronidase containing 10 turbidity units per cc. was used. Following application of topical pontocaine anesthesia, 0.1 cc. of this solution was injected with a 27-gauge needle into the anterior chamber of the right eye of 12 albino rabbits once daily for five consecutive days. The left eye of the same rabbits was injected with 0.1 cc. of physiologic saline. Gross findings were as follows:

1. At the time of the fourth or fifth intraocular injection, the conjunctiva of several eyes receiving hyaluronidase was friable.

2. Gross changes in the hyaluronidase-treated eyes appeared early and were severe. Corneal clouding appeared in all cases after the fifth injection. The corneal opacity varied in density but obscured the details of the iris in the overwhelming majority. Keratectasia appeared in seven of 12 eyes. Iritis was present in 10 eyes after the second injection and in most instances persisted throughout the injection. Only one eye had no apparent iritis on the final day. Histologic studies of the enucleated eyes revealed destruction of the corneal stroma with massive corneal edema, iritis, and congestion of the ciliary processes.

A further study of the injection of hyaluronidase into the anterior chamber of the eye has been reported by Moor and Shahan[7] who administered the drug to 11 patients with glaucoma and who gave a more favorable report. Their most striking case was a patient with chronic, noncongestive, absolute glaucoma with an intraocular pressure of 65 mm. Hg (Schiötz) before injection. One injection of hyaluronidase into the anterior chamber was followed by a very rapid fall of tension to below 20 mm. Hg with a slow return to 30 mm. Hg. The tension remained stable at this point during the 26 days in which the patient was under observation.

It has been suggested[8] that a difference in preparation of the hyaluronidase may have accounted for the differing results reported by Linn and Ozment[6] and Moor and Shahan.[7] The latter authors prepared the drug themselves from testicular tissues obtained from the packing plant. The possibility that the reaction produced by the injection of hyaluronidase into the anterior chamber by Linn and Ozment could have been related to the degree of purification or sterility of the preparation[9] has also been discussed. In this connection it is pointed out that of the 12 eyes used as controls, two showed an iritis on the second day, one showed a probable iritis on the first, and another on the second day. On the fifth day three of the control eyes showed a clouding of the cornea and two of these showed a keratectasia.

Part II

This report is concerned with a series of 10 rabbit eyes, eight of which received hyaluronidase (Alidase-Searle) in the anterior chamber and two control eyes which received anterior-chamber injections of physiologic saline.

Of the eight Alidase-treated eyes, Eyes 1 through 7 received 0.05 cc. of Alidase (500 viscosity-reducing units* per cc. or 25 vis-

* While there is no direct clinical measurement correlating viscosity-reducing units with turbidity reducing units, it has been assumed by various authors that 500 viscosity units equals the clinical activity of approximately 150 turbidity-reducing units.

cosity reducing units in 0.05 cc.) daily into the anterior chamber for five consecutive days; Eye 8 received 0.1 cc. of Alidase (50 viscosity-reducing units in 0.1 cc.) daily into the anterior chamber for five consecutive days.

The control eyes, Eyes 9 and 10, received 0.1 cc. of physiologic saline in the anterior chamber for the same period of time. The injections were made in the usual fashion, using a 27-gauge needle and topical pontocaine for anesthesia. Beginning 24 hours after the initial injection, the eyes were examined daily for five days and again on the seventh day and in some cases on the 14th day after the initial injection. Table 1 records the observations. A mild ciliary flush was graded 1-plus; moderate, 2-plus; moderately severe 3-plus; very severe 4-plus. A mild iris hyperemia was graded 1-plus; moderate, 2-plus; moderately severe 3-plus; very severe 4-plus.

Of the seven eyes receiving 0.05 cc. of Alidase, the first showed a mild hyperemia of the iris from the third to the fifth day. The second showed a mild iris hyperemia on the fourth day which had almost disappeared by the fifth day and was completely gone by the next examination on the seventh day.

The third eye showed a moderate iris hyperemia on the first day after injection and a mild iris hyperemia from the second to the fifth day. The eye was perfectly normal at the time of the next examination on the seventh day. Eye 4 showed a mild iris hyperemia from the first to the seventh day and was completely normal on the 14th day. The fifth eye was completely normal with the exception of a mild ciliary flush from the second to the fifth day.

The sixth eye showed a moderate iris hyperemia 24 hours after the first injection which had almost disappeared in 72 hours and which was completely gone in 96 hours. The seventh eye showed a mild hyperemia of the iris on the first day, a mild local iris hyperemia on the second day, and a moderate hyperemia on the third day. On the fifth day a mild hyperemia was present; however, hyperemia was gone by the seventh day.

The eighth eye, which had received 0.1 cc. of Alidase, showed a moderate iris hyperemia on the first day and mild local iris hyperemia on the second, fourth and fifth days. The eye was completely normal on the seventh day.

Eye 9, the first control, appeared essentially normal. The second control, Eye 10, showed a moderate iris hyperemia on the fourth day which had disappeared on the fifth day.

On the fifth day after the initial injection, 24 hours after the last instillation, two of the eyes, Eyes 2 and 5, were considered normal, one of them, Eye 1, was normal except for a mild iris hyperemia, and three of them, Eyes 3, 6, and 8, showed only a mild ciliary flush with a mild hyperemia of the iris. Eye 4 showed a mild ciliary flush with mild local haze at the site of injection of Alidase, some of which had gone into the cornea.

Significantly, by the seventh day after the initial injection none of the Alidase-treated eyes showed anything of significance with the exception of Eye 4 which showed a mild ciliary flush with a mild iris hyperemia, both of which had disappeared at the time of the next examination one week later.

At no time did any of the eyes which received anterior chamber injections of Alidase display an alarming reaction such as edema of the lid, conjunctiva, or cornea. Corneal ulcerations, perforation, or hypopyon did not occur. No changes in the clarity of the vitreous were noted. In none of the eyes was friability of the conjunctiva noted as was reported by Linn and Ozment.[6] In another series of rabbits which had received subconjunctival Alidase, no friability of the conjunctiva was observed grossly. In one of these, microscopic examination of the conjunctiva revealed no abnormality.

If it is possible to consider one turbidity-reducing unit as being approximately three viscosity-reducing units, these results are in sharp contrast with those obtained by Linn and Ozment[6] in spite of the fact that in Eyes 1 to 7 approximately 7.5 times as much hyal-

TABLE 1

OBSERVATIONS AFTER INJECTION OF HYALURONIDASE INTO THE ANTERIOR CHAMBERS OF RABBIT EYES

Findings	Before Injection	Hours After Initial Injection				5th Day	7th Day	14th Day
		24	48	72	96			
EYE 1								
Conjunctival hyperemia	0	+(Local)	±(Local)	±	±	0	0	0
Ciliary Flush	0	0	0	+	+	0	0	0
Corneal Haze	0	0	0	0	0	0	0	0
Pupil Size	6	8	8	8	8	8	7	8
Iris Hyperemia	0	0	0	+	+	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 2								
Conjunctival hyperemia	0	0	0	0	0	0	0	
Ciliary Flush	0	0	0	0	0	0	0	
Corneal haze	0	0	0	0	+(Local)	0	0	
Pupil Size	7	8	8	8	7	7	6	
Iris hyperemia	0	0	0	0	+	±	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 3								
Conjunctival hyperemia	0	0	0	±	0	0	0	0
Ciliary flush	0	±	±	+	±	+	0	0
Corneal haze	0	±(Local)	±(Local)	0	±(Local)	±(Local)	0	0
Pupil size	8	7	7	6	6	7	7	7
Iris hyperemia	0	+ +	+	+	+	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 4								
Conjunctival hyperemia	0	0	0	±	±	0	0	0
Ciliary flush	0	+	±	+ +(Local)	+	+	+	0
Corneal haze	0	+ +(Local)	+(Local)	0	0	0	0	0
Pupil size	7	7	7	7	6	6	7	5
Iris hyperemia	0	+	+	+	+	+	+	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 5								
Conjunctival hyperemia	0	0	±	0	0	0	0	
Ciliary flush	0	±	+	+	+	0	0	
Corneal haze	0	+ +(Local)	+	0	0	0	0	
Pupil size	9	8	8	6	9	5	6	
Iris hyperemia	0	0	0	0	±	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 6								
Conjunctival hyperemia	0	±	±	±	0	±	0	
Ciliary flush	0	+ +	+	+ +	±	+	0	
Corneal haze	0	±(Local)	±(Local)	0	+(Local)	+	0	
Pupil size	8	8	8	7	9	7	7	
Iris hyperemia	0	+ +	+	+(Local)	0	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 7								
Conjunctival hyperemia	0	0	+	+	±	0	0	
Ciliary flush	0	±	+	+ + +	+ +	0	0	
Corneal haze	0	±	+	+(Local)	+(Local)	0	0	
Pupil size	9	7	5	6	6	7	7	
Iris hyperemia	0	+	+(Local)	+ +	0	±	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 8								
Conjunctival hyperemia	0	0	±	+	0	±	0	0
Ciliary flush	0	±	+	+	+ +	+	±	0
Corneal haze	0	±(Local)	±(Local)	±	+(Local)	+(Local)	0	0
Pupil size	8	7	7	8	7	5	6	8
Iris hyperemia	0	+ +	+(Local)	0	+(Local)	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 9								
Conjunctival hyperemia	0	0	0	0	0	+ +	±	
Ciliary flush	0	+	±	0	+	±	+	
Corneal haze	0	0	0	0	0	0	0	
Pupil size	4.5	5	7	8	6	5	5	
Iris hyperemia	0	0	0	0	0	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 10								
Conjunctival hyperemia	0	0	0	0	0	0	+	
Ciliary flush	0	+	+	+	+ +	±	+	
Corneal haze	0	0	0	0	0	+(Local)	+(Local)	
Pupil size	5	5	7	8	5	7	7	
Iris hyperemia	0	0	±	0	+ +	0	±	
Lens haze or opacity	0	0	0	0	0	0	0	

uronidase was injected and in Eye 8 approximately 16.32 times as much hyaluronidase was used.

SUMMARY

Various ophthalmologic uses of hyaluronidase are reviewed. The clinical and experimental work of Linn and Ozmet[6] is presented; these authors reported that instillation of hyaluronidase into the anterior chamber of the rabbit eye produced iritis, clouding of the cornea, and keratectasia.

The results are compared with our series in which no adverse effects of consequence were

noted when hyaluronidase was injected into the anterior chamber of the rabbit eye. It is suggested that the difference in the results obtained may have been due to differences in preparations used or in the degree of purification of the earlier hyaluronidase product.

On the basis of these studies, further clinical investigations utilizing anterior-chamber injections of hyaluronidase are planned.

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PREVALENCE AND CAUSES OF BLINDNESS IN ICELAND

With special reference to glaucoma simplex

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Previous information

In the Annual Health Report for Iceland, figures are given showing the number of blind persons reported by the district physicians. As stated there, however, the report is far from exhaustive. Thus the figure of 295 given for 1948 and referred to in the *Epidemiological and Vital Statistics Report* (**6**: No. 1, 1953) is by far too low. The true number of blind persons has undoubtedly been well over 400 as will be seen from this article.

More accurate information on the prevalence of blindness is obtained through the census methods. Not only are the blind enumerated and registered at the general decennial censuses but they are also registered toward the end of each year, when the parish rectors and municipal authorities take the annual census.

The census papers include a column in which is stated whether the enumerated person suffers from blindness. According to the instructions given "all persons who are totally blind, or cannot find their way in places unknown to them before by means of their sight," shall be registered as blind.

Table 1 shows the number of blind persons registered and the rate of blindness according to the census of 1880 and 1890 and the decennial censuses from 1910 on.

Special survey, 1940

An experienced ophthalmologist in Reykjavik (Sveinsson, 1944) examined critically the blind register for 1940. With the aid of the Iceland Association for the Aid of Blind People, he tried to contact all the registered blind and to obtain information from the doctors about those he had not seen himself. He arrived at the conclusion that the number of blind persons was at least 409 (379 ac-

TABLE 1

PREVALENCE OF BLINDNESS ACCORDING TO CENSUS REGISTRATION

Year	Number of Blind	Rate per 100,000 Population
1880	192	270
1890	273	380
1910	305	360
1920	387	410
1930	371	340
1940	379	310
1950	364	254

cording to the census). Of these, 372 or 91 percent were over 59 years of age. As far as he could ascertain, glaucoma simplex had been responsible for the blindness in about 70 percent of the cases.

PRESENT SURVEY

With the aid of the general census taken on December 1, 1950, and with the further assistance of the Association for the Aid of Blind People, I have been able to trace 434 blind people in Iceland. This must be regarded as a minimum figure, as it is unlikely that every single case has been detected. Here I have termed as blind people those whose corrected vision was 3/60 Snellen or less.

The total number of population in 1950, according to the census, was 143,961. Accordingly, the rate of blindness is 300 per 100,000 population, which is a much higher rate than in Europe or in America. In England, according to the 1949 registration, the blindness rate was 179 per 100,000 population. For France (census 1946) the rate was 107; Netherlands (special survey 1948) 47; Norway (special survey 1948), 99; the United States (estimate 1950), 173; and Canada (registration 1948), 125 (Epidemiological Vital Statistics Report, **6**: No. 1, 1953).

Although it may be assumed that the enumeration of blind people is liable to be less accurate in the more populous countries, it seems safe to conclude that blindness is actually considerably more prevalent in Iceland than in other countries with a comparable standard of general health.

Table 2 shows the distribution of blindness according to age and sex. Of the total number, 243 are males (56 percent) and 191 females (44 percent). For children (0 to four years of age) the blindness rate is unusually low (five per 100,000) and for the young and middle-aged up to 60 years, the rate is not conspicuously high. But after the age of 60 years and especially after the age of 70 years is reached, the rate increases rapidly, even to such extent that, in the age group 70 to 79 years, 19 per thousand are blind, in the age group 80 to 89 years, every 10th person, and in the group 90 years and over every fourth person, at least, is blind.

Figure 1 further illustrates the age dis-

TABLE 2

AGE DISTRIBUTION OF BLIND POPULATION

Age Groups (years)	Males	Females	Both Sexes	Percent	Rate per 100,000
0– 4	1	0	1	0.2	5
5–14	4	1	5	1.1	19
15–19	1	2	3	0.6	25
20–29	0	3	3	0.6	13
30–39	5	4	9	2.1	47
40–49	7	2	9	2.1	56
50–59	9	9	18	4.1	135
60–69	16	20	36	8.3	434
70–79	64	31	95	22.1	1872
80–89	109	78	187	43.2	9800
90 and over	26	40	66	15.1	26613
Not stated	1	1	2	0.5	
Total	243	191	434	100%	

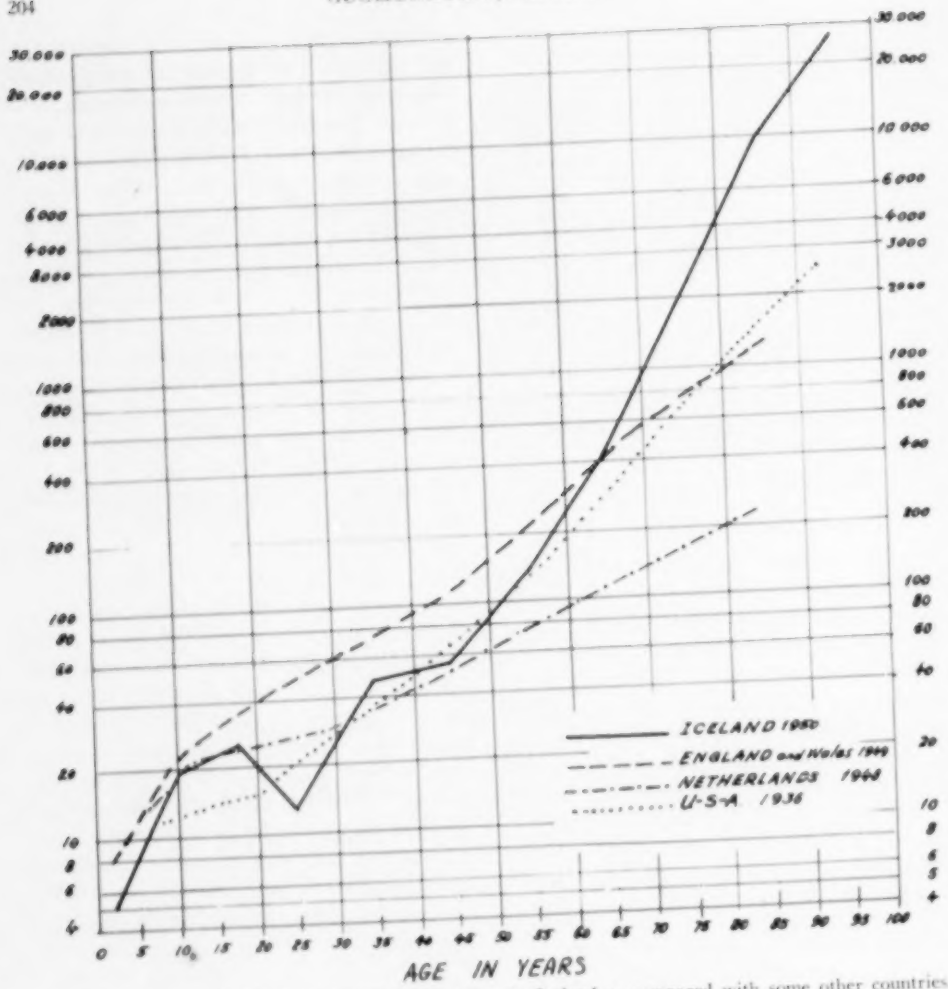

Fig. 1 (Björnsson). Blindness rates in age groups in Iceland as compared with some other countries. Rates per 100,000 population. (The curves for England, the Netherlands, and the United States are drawn from data given in *Epidemiological and Vital Statistics Report*, 6: No. 1 [Jan.] 1953.)

tribution of blindness characteristic for Iceland. Up to the age of 60 years the rate of increase with age is on the whole similar to that observed in other countries but thereafter an extraordinarily rapid rise takes place. Thus, of the total number of blind, no less than 89 percent were 60 years of age and over, which is a much higher percentage than found elsewhere. It is obvious, therefore, that the unusually high general rate of blindness in Iceland is caused by a remarkably great prevalence of blindness among old people. This latter, again, is caused by the high incidence of glaucoma simplex as will be reported later.

It is of great importance to know at which age the blindness set on. My investigations revealed that 12 percent had become blind before the age of 15 years, 25 percent between 15 and 60 years of age, and 63 percent after the age of 65 years.

There is a considerable difference between

the frequency of blindness in towns as contrasted to rural districts. The rate is 2.2 per thousand of the inhabitants of towns (population 88,408; of Reykjavik alone, 55,980) against 4.3 per thousand living in the rural districts (population 55,553). The reason for this may be, partly, that it is more difficult for old people in the rural districts to get adequate and controlled treatment than it is for people living in towns, especially in Reykjavik, where there is a sufficient number of ophthalmologists. Another reason is, that people belonging to the higher age groups are comparatively more numerous in the rural districts than in the towns, as young people have left the rural districts and settled in the towns in increasing numbers during the past few years.

Causes of blindness

Of the 434 blind in Iceland, I have had the opportunity to examine 143, or about 33 percent of the total cases. Most of these people live in Reykjavik.

Table 3 shows the age distribution of the analyzed cases. Although this table represents about one third of the total material, its representative value may be impaired by its being derived from one locality (Reykjavik) only. It should also be noted that the age distribution differs slightly from that of the total material.

Table 4, in which the blind are grouped according to visual acuity, shows that about one third of all the patients are totally blind. Two thirds are blind according to Trousseau's definition of blindness.

Table 5 shows blindness according to causes.

TABLE 4

Various degrees of blindness

Visual Acuity	Number of Cases	Percent
No perception of light	46	32.2
Light perception only	19	13.3
Hand movements to finger counting under 1 meter	31	21.6
1/60 to 3/60 Snellen	47	32.9
Total	143	100.0

Glaucoma

It has been known for a long time, that blindness due to glaucoma is the most frequent cause of blindness in this country. Of the 143 persons examined, 75 (45 males and 30 females, all over the age of 60 years) had become blind from glaucoma; well over 50 percent of the persons examined or 66 percent of those aged 60 years and older. Allowing for the difference in age distribution

TABLE 5

Causes of blindness in Iceland (1950)

Cause	Number of Cases
Glaucoma simplex	75
Cataract, senile	7
Cataract, congenital	5
Retinitis pigmentosa	6
Myopia, excessive	6
Amotio retinae with myopia	2
Amotio retinae without myopia	1
Degeneration of cornea	3
Atrophia cerebralis congenita	1
Optic atrophy of various causes	6
Senile macular degeneration	9
Chorioretinitis	6
Iridocyclitis and keratitis	9
Sympathetic ophthalmia	4
Injuries	3
Total	143

TABLE 3

Age distribution of analyzed cases

Age Groups (years)	Males	Females	Both Sexes	Percentage Distribution
0–14	5	1	6	4.2
15–59	11	13	24	16.8
60 and over	53	60	113	79.0
Total	69	74	143	100%

(tables 2 and 6), this would mean that 60 percent of the total cases of blindness were caused by this single disease.

For comparison, it may be mentioned that the corresponding figures are 13.4 percent in England (Sorsby, 1950), 11.6 percent in the United States (Lancaster and Foote, 1951), and 4.5 percent in Norway (Holst, 1952).

The glaucoma which occurs in Iceland is almost exclusively primary chronic simple glaucoma of the wide-angle type. Acute glaucoma is very rare in Iceland, about one or two percent of all cases.

Table 6, which gives the age distribution of 75 cases of blindness from glaucoma, shows that the patients with one single exception were all over 70 years of age. This table shows also the average age at the onset of blindness. According to this, it is rather rare that people in Iceland, or at least in Reykjavik, become blind of glaucoma before they have reached the age of 70 years.

It is remarkable (table 6) that 65 of the persons listed have had operations for the glaucoma, in some cases iridencleisis, in other cases trephining operations. In most of the cases, the patient had come so late for treatment that the eyes had become irreparably damaged and were on the verge of being "socially blind" when the glaucoma was first detected. Those not operated on, and with absolute glaucoma had not come to an ophthalmologist until the disease had reached a precarious state. A few patients had developed postoperative iridocyclitis or complicated cataract, which had further increased their blindness although glaucoma was termed the primary factor.

There is no exact information available on the frequency of glaucoma in Iceland. An experienced ophthalmologist has, however, reported that out of 9,000 ophthalmic cases he found well over five percent with glaucoma (Skúlason, 1933). The corresponding percentage is about one or two percent in most of our neighboring countries (Duke-Elder, 1945). Based on this observation, the same ophthalmologist is of the opinion that about one in every 100 persons in Iceland has glaucoma, in which case those in the entire country having glaucoma would number about 1,400 to 1,500 persons. This means that nearly every sixth person with glaucoma has become blind, apart from those many who suffer from impaired vision without being counted blind.

What causes this high percentage of blindness from glaucoma? No doubt the main reason is that many patients with this disease come too late to an ophthalmologist for treatment, and this is chiefly because the disease shows almost no symptoms and progresses slowly, with gradually diminishing visual acuity and progressive contraction of the visual field; persons over 60 years of age often think this is only a natural phenomenon of increasing senility and therefore put off coming for treatment until it is too late.

TABLE 6

GLAUCOMA CASES ANALYZED

Age Groups (years)	Number Examined	Number of Glaucoma Cases	Number of Cases Operated	Average Age at Onset of Blindness (years)
0–59	30	0		
60–69	18	1	1	
70–79	26	21	20	68
80–89	54	41	35	74.6
90 and over	15	12	9	82.2
Total	143	75	65	

When glaucoma patients come for treatment before the disease is too far advanced, good results are obtained in 70 to 80 percent of the cases.

Other causes

Blindness caused by senile cataract is not common in Iceland, and besides, most of the patients are operated on before they are counted blind. The seven patients with cataract whom I examined were so enfeebled with age that they were not considered able to stand the strain of an operation, or they suffered from senile macular degeneration.

Most of the cases of chorioretinitis, iridocyclitis, and keratitis were considered of tuberculous origin; therefore, it is possible that the new drugs used in the therapy of tuberculosis may in the future help to decrease the number of blind. Tuberculosis has declined in Iceland for the last two decades, chiefly the result of a systematic search for carriers of the disease.

In other groups of blindness it will probably not be possible to decrease the number of cases for some years to come for they are mostly cases of hereditary or degenerative origin. I found seven cases of blindness from accidents, in four of which the patients had become afflicted with sympathetic ophthalmia. I do not know of any case of blindness caused by industrial accident.

Blindness caused by syphilis, ophthalmia neonatorum, trachoma, and xerophthalmia is unknown in Iceland.

Six children in the whole country under the age of 15 years were registered blind. I have had occasion to examine all of them. Three of them had congenital cataract; all were idiots. They had all been operated on but with poor result. One was blind from congenital atrophy of the cortical visual center. Another had atrophy of the optic nerve postencephalomeningitis. The sixth one, blinded by an explosion, had for some years been the only pupil at the School for the Blind in Iceland.

Preventive measures and future outlook

There is little doubt that the incidence of blindness—already falling as can be judged from the census figures—can be reduced to a considerable extent.

Ophthalmology as a specialty is of comparatively recent origin in Iceland. Until 1920, only one ophthalmologist had practised in the whole country; after that date, the number increased. Optometrists have never been allowed to practise. For several years four ophthalmologists have, on behalf of the health authorities, travelled about in the country for two months every summer. They have found many glaucoma patients who otherwise would have come too late for treatment. They have also had opportunity to examine postoperative glaucoma cases.

Radio lectures have been arranged and articles published to inform the people about glaucoma and its perilous character. These measures do not seem to be sufficient to make people come in time for treatment. Plans are, therefore, now being considered to start a systematic search for glaucoma cases among people over 60 years of age. This ought to be possible, as there are only 16,000 persons 60 years of age and over in Iceland. By these means glaucoma ought, in most cases, to be detected in the early stages and the treatment accordingly be made more easy, whereupon it might be expected that, after some years, the number of blind in Iceland will have decreased considerably. It is also of great importance to search for cases of hereditary glaucoma, as heredity seems to be a conspicuous factor in Iceland.

Summary

In a special survey based on the general census of 1950 and supplemented with further information obtained through the aid of the Icelandic Blindness Association, 434 blind persons were traced throughout the whole country (the census figure was 364). The blindness rate therefore is 300 per

100,000 population, which is a much higher rate than known elsewhere in Europe or America. It is, however, only after the age of 60 years that the blindness is frequent, 89 percent of all the blind persons being above that age. The most common cause of blindness, glaucoma simplex, is responsible for approximately 60 percent of the total number of cases, although it rarely occurs below the age of 70 years. Measures aiming at reducing the blindness rate should be directed primarily against glaucoma.

Snorrabraut 83.

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BENIGN CALCIFIED EPITHELIOMA OF EYELID*

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Benign calcified epithelioma is rarely mentioned in the ophthalmic literature. The clinical diagnosis of this lesion is practically impossible and the histologic features may present some difficulties in diagnosis.

Case report

A woman, aged 23 years, was seen in the out-patient department in October, 1953, complaining of a localized swelling in her left upper lid. Six weeks before she was hit by a hammer in the region of her left eye. The upper lid became swollen and, as the swelling subsided, she noticed a painless nodule beneath the skin of the upper lid. At first she paid no attention to it but, when the nodule increased in size, she decided to consult an ophthalmologist.

The patient had been seen previously in 1944 for a skin erosion in her left upper lid following a slight injury. The wound healed without complications within a few days. In February, 1953, she came to the clinic for treatment of an external stye in the same lid. The patient visited our clinic on and off for treatment of an alternating squint combined with a refractive error.

Present examination revealed a small round tumor in the left upper lid, five mm. from the upper and six mm. from the temporal orbital margin. It was hard, adherent to the overlying skin, and freely movable from the underlying tissue. The regional preauricular lymph gland was not enlarged. A clinical diagnosis of atheroma was made and the tumor was completely removed. The postoperative course was uneventful.

Microscopically, the lesion was a hard, well-encapsulated nodule, seven mm. in diameter. The cut surface was grayish-white and contained minute foci of friable material.

Histologically, the lesion was composed of a cellular stroma in which were two types of epithelial cells arranged in nests of various sizes.

One cell type consisted of weakly stained squamous cells with well-preserved cell

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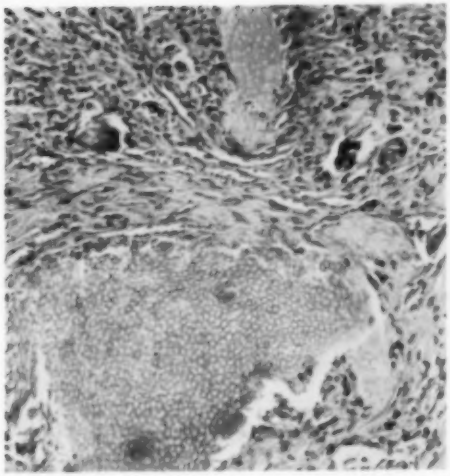

Fig. 1 (Kornblueth and Liban). Sheets of shadow cells lying in a cellular stroma. Foreign-body giant cells are numerous. (Hematoxylin-eosin, ×145.)

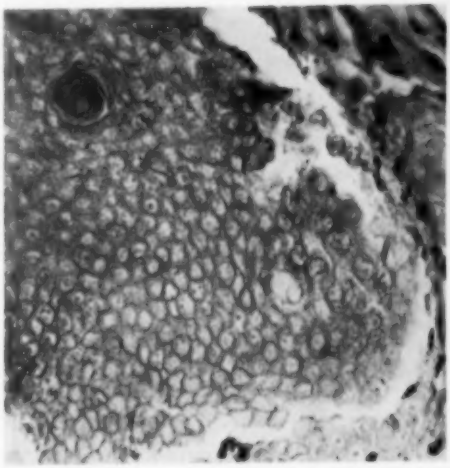

Fig. 2 (Kornblueth and Liban). Higher magnification (×460) of shadow cells. (Hematoxylin-eosin.)

borders and unstained nuclei (shadow cells) (figs. 1 and 2). Foci of keratinization were scattered within sheets of these cells.

The second cell type consisted of overstained epithelial cells with ill-defined cell borders and round or elongated, deeply stained nuclei and sparse cytoplasm (figs. 3 and 4).

In a few places transition of the dark cells to the shadow cells was observed. The stroma was made up of a varying number of fibroblasts, histiocytes, lymphocytes, and foreign-body giant cells. The latter were usually located along the edges of the shadow-cell groups (fig. 1). Here and there fine dark granules showing a positive von Kossa reaction for calcium were found within necrotic epithelial masses.

The tumor was diagnosed as a benign calcified epithelioma.

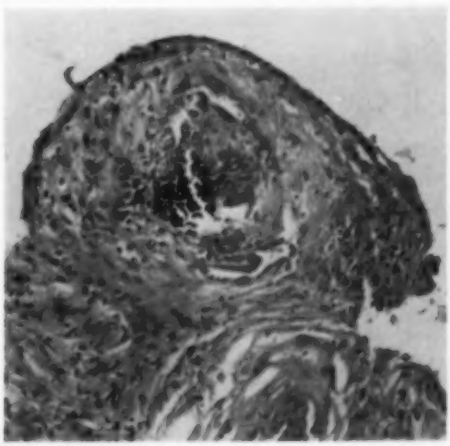

Fig. 3 (Kornblueth and Liban). Small groups of basophilic cells. (Hematoxylin-eosin, ×130.)

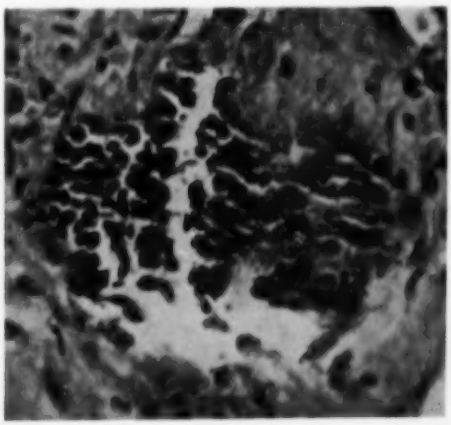

Fig. 4 (Kornblueth and Liban). Higher magnification (×460) of basophilic cells. (Hematoxylin-eosin.)

Discussion

Benign calcified epithelioma of the skin, first described by Malherbe and Chenantais[1] in 1880, is a tumor of rare occurrence. According to Lever and Griesemer[2] it is seen once per 2,000 routine surgical specimens. Allen[3] found 38 cases of this lesion among 8,000 pathologic specimens of skin received at the Armed Forces Institute of Pathology during World War II.

The tumor occurs most frequently in the region of the head and neck and to a lesser degree on the extremities and the trunk. Ch'in,[4] analyzing 116 cases of this tumor reported in the literature up to 1933, found 12 cases which were located in the eyebrow, eyelid, and orbit. Among his own 10 cases there was one originating from the eyelid.

Cote[5] added one and Ashton[6] three more cases occurring in the eyelid.

The tumor is found mainly in young people and appears to be more frequent in females than in males. Its growth is slow. Recurrences after complete removal are rare. The tumor shows no evidence of malignancy. Calcification is a frequent but not an obligatory finding as the name given to the lesion would imply.

The histologic appearance of the tumor is characteristic. According to Lever and Griesemer,[2] it is composed of two types of cells, viable basophilic cells and nonviable shadow cells.

The basophilic cells either are arranged in a bandlike fashion around masses of shadow cells or lie in irregularly distributed clusters. Shadow cells develop from the basophilic cells and represent incompletely keratinized cells.

This growth should be differentiated from an epidermal cyst, which may also contain shadow cells, calcifications, and a stroma rich in foreign-body giant cells. In the epidermal cyst, however, the basophilic cells are missing and most of the squamous cells are viable and arranged in bands adjacent to small groups of shadow cells. In addition, much keratinized material is usually present in the epidermal cyst (Lever[7]).

The histogenesis of the tumor is not clear. An origin from sebaceous glands (Malherbe and Chenantais[1]) or from sebaceous-gland anlage (Cote[5]) has been proposed. Turhan and Krainer[8] believed that the cells of origin are the medullary cells of the hair matrix. According to Lever and Griesemer,[2] the tumor develops from immature hair matrix cells.

The etiology of the tumor is unknown. Malherbe claimed injury as a cause in three cases. One case of Ch'in and the second case of Ashton appeared some time following an injury. In our case the tumor developed in an eyelid which had been traumatized twice and which had been inflamed once.

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PHTHIRIASIS PALPEBRARUM

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In the language of deSchweinitz, Phthiriasis palpebrarum "occurs when the Phthirus pubis or crab louse forsakes its seat of predilection and finds a habitat among the eye lashes." Duke-Elder has described it as "infestation of the lashes by crab louse, a creature more at home around the genital organs."

The correct generic name of the crab louse is Phthirus. The specific name "pubis" (Linnaeus) 1758 antedates "inguinalis" (Leach) 1815. According to Buxton, pubis is therefore correct by the law of priority. It belongs to order Anoplura (sucking lice); family—Pediculidae; subfamily—Pediculaenae; genera—phthirus.

Anatomically it resembles Pediculus except that its second and third pairs of legs (and claws) are stouter. The abdomen is more or less telescoped so that the first three abdominal spiracles (of segments 3, 4, and 5) are almost in one transverse line. The abdomen is broader than long, resembling a crab (fig. 1).

The biology of Phthirus is partially known, thanks to the ingenious work of pioneers like Nuttal (1918) and Payot (1920), who confined the lice on their own legs beneath a stocking and observed them daily. Females lay two to three eggs per day on an average. The eggs are laid cemented on to the hairs in a manner similar to those of the other species. They are slightly smaller in size, darker in color, and their cap or operculum is conical and covered with prominent round, perforated nodules on the entire surface. The cement covers a greater length of the hair running considerably below the base of the egg. The eggs hatch in six to eight days, after which the louse moves at once to the base of the hair on which it was hatched out, clinging to this hair alone (fig. 2).

Nuttal thought that spread was mainly by means of the egg which became detached

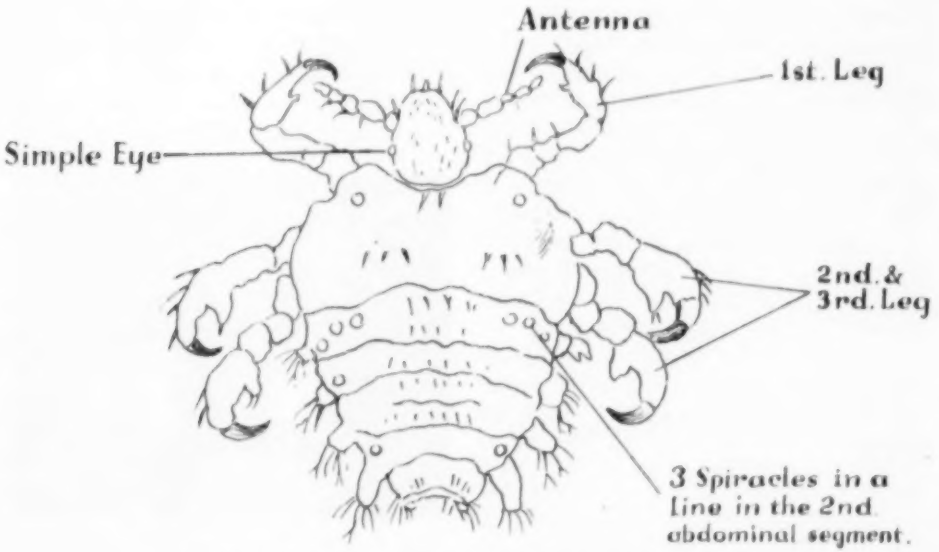

Fig. 1 (Bose). Phthirus pubis. (Drawn from an actual specimen.)

Fig. 2 (Bose). Ovum of Phthirus pubis cemented to an eyelash.

with the hair to which it had been cemented. There are three stages in the life of a larva (duration 13 to 17 days). The adult settles down at one spot grasping the hair with the legs of both sides and then, inserting its mouth parts, feeds almost continuously. They and their larva cannot survive more than a day away from the host. They never wander more than an area of 10 by 16 cm. in their whole lifetime. They are much less active than Pediculus humanus.

Buxton thinks that Phthiriasis of eyelashes runs in families of low hygienic standards. He has seen a record of 100 crab lice in the eyelashes of a single person. Infants are usually infested from their mothers. Examination of samples of crops of hair has shown the gross rate of scalp infestation to be 0.5 percent. Though many believe sexual contact is the mode of transmission (as the French name "papillon d' amour" suggests), Buxton thinks "head to head" transmission is the most probable mode in children.

Persons differ in their sensitiveness to the Phthirus pubis bite. The "blue spots" which result from the bite are 0.2 to 3.0 cm. in diameter with an irregular outline. They are painless, do not disappear on pressure, and appear in the deeper tissues some hours after the crab louse has bitten, and last for a few days. The blue spots do not develop invariably after each bite but when they do appear they are characteristic of Phthirus and not of Pediculus (Nuttal, 1918). Blue spots have been produced experimentally by the injection of crushed reniform salivary glands, the tubular glands not producing this effect. What this bluish pigment is has not yet been found out.

Transmission of diseases (typhus) by its bite is rare but there is a possibility of its transmitting diseases by its airborne dejecta. This point requires further study and investigation. In communities where Phthirus is common, it might be an actual transmitter in this way. When numerous, Phthirus may cause a simple fever which subsides when the pests are removed.

Control of phthiriasis

Hair on the trunk, arm pits, and pubic region should be clipped off and all close contacts of husband and wife, mother and child should be treated.

DDT dust or emulsion, lauryl thiocyanate emulsion (but other thiocyanate application may be irritating), rotenone or pyrethrum dusts, and pyrethrum sprays are mentioned by different observers as useful remedies. But one should not use bis-ethyl xanthogen.

That the condition is rare, has been admitted by both English and American observers (Schwenk, 20 in 20,319 patients; Hirschburg, three in 40,000 patients; Despagnet, two in 12 years; Jullien, one in 5,000 patients; Allen, 85 in 5,974 patients. Quoted by Friedman and Wright).

The condition, first reported by Celsus (1478) in the European literature, was fully established by Jullien (1891-92). Only Schwenk and Professor Auberet did not think the condition at all rare.

Infrequent reference in the Indian ophthalmic literature may give rise to an

Fig. 3 (Bose). Eyelashes and hairs of eyebrow infested with many dirty-looking, pearl-colored nits.

erroneous idea that the condition is still rarer in India. However, Roy and Ghosh (1944) saw 19 cases between 1942 to 1944 of which four cases were in children below the age of 12 years. In all those cases eyelashes were infested. The symptoms were severe blepharitis and conjunctivitis. In one patient, Phthirus pubis were also found on the temple (both adult and nits). The rest of the cases were in adult males in whom no infestations were seen either on the back or on the legs below the knee or on the head; only one patient had infestation confined to one arm and another to the chest only. The pubic and the peri-anal region were affected in the rest.

Ghosh has supplied his unpublished records of Phthiriasis palpebrarum from 1945 to 1951. He saw a total number of 18 cases, 14 males, four females, five below the age of 12 years. In only one of these cases, could the source of infestation be traced, (train journey). One woman had double infestation with pediculus and phthirus.

Both Manson-Bahr and Duke-Elder have assumed that the mode of transmission is from the pubic hairs to the eyelashes via the hand. This is also supported by Wright who saw a 19-year-old, right-handed college boy whose right eye was infested with Phthirus. This theory seems untenable for different observers (Goldman, Roy and Ghosh) have seen the condition more commonly in children. Buxton's "head to head" theory of transmission seems possible but Nuttal's theory of transmission by means of eggs as already mentioned seems to be more probable.

According to Goldman, infestation of the scalp by Phthirus pubis, though uncommon, usually occurs in children and is associated with eyelash infestation. He saw five cases from 1941 to 1948. Even in the severest cases, the extent and degree of scalp infestation were much less than the infestation with Pediculus capitis. Age varied from 19 months to seven years. Two patients were boys and six girls. One of the girls, aged seven years, had extensive involvement of the whole scalp without, however, eczematoid dermatitis or adenitis. Goldman concluded that infestation of the scalp should be suspected in children with Phthiriasis palpebrarum. The involvement of the scalp is likely to be mild, is usually adjacent to the forehead, and is often without any subjective complaint.

Professor Auberet has pointed out that the presence of lice in the lashes of an inflamed palpebral margin does not prove that they are responsible for the blepharitis. Their presence is coincidental rather than casual.

Case report

U. K. B., a Hindu boy, aged 12 years, came to me on October 10, 1948, with the following complaints: (1) A sensation of a creeping insect in both his eyes and an intense desire to tear away the lashes, one month; (2) a history of a crablike insect coming out of his right eye, one month earlier; (3) falling hairs in the region of eyebrows for one month. On examination, the lashes, especially those of the lower lids, were found to be few in number and broken at half their length. There were black bodies, 12 or 13 in number, sticking to the upper and lower eyelashes and also to the eyebrow. The conjunctiva, cornea, and anterior chamber were all normal; Pupil reaction was brisk and vision in both eyes was 6/5.

Two or three days after his first visit, the boy came to me with one living crablike adult insect, which was, later on, very kindly identified by Dr. S. M. Ghosh (Department of Entomology, School of Tropical Medicine, Calcutta) as a female adult Phthirus.

The boy was given pyrethrum ointment in vaseline (1:8). Unfortunately the result could not be followed up as the patient did return.

Treatment

Duke-Elder advises removal of the parasites by forceps, which is not always an easy job. Besides removal, he also advises the use of one-percent Hydrarge oxide flavum ointment locally, one-percent drops and ointment of physostigmine locally, and lastly DDT and

Benzyl-zenzoate in the form of ointment.

In addition to mass control, Craig and Faust advise treatment of individuals by drawing each egg off the hair with a pair of small forceps.

Roy and Ghosh after discussing 2-pediculocides lauryl-thiocyanate and lethane 384 special (also a thiocyanate compound) have recommended pyrethrum ointment (1:8) prepared with vaseline. The adult lice and larva are killed and the dead become dislodged within 24 hours. Pyrethrum ointment, which does not act on nits, should be continually applied for five consecutive nights—till the last nit has hatched and the larva is under control.

For treatment of infestations of the pubic, scrotal, and anal regions, Roy and Ghosh have found pyrethrum-kerosene spray to be ideal; the existence of ring worm or eczema is no contradiction as with thiocyanates. Roy, Ghosh, and Chopra thought that the normal entry of the active constituents of pyrethrum was through the respiratory openings of the insect and not through the cuticle.

Discussion

From the available records published in India it seems that Phthiriasis palpebrarum was first described by Mitter who removed nits from the eyelashes of a boy, aged seven years, at Kasauli, India, in 1917 (Nuttal). Its occurrence is not so rare in India as has been mentioned by European and American observers. Its treatment is intimately connected with the treatment of other infested parts of the body of the patient and effective delousing measures for his close associates and environment. The problem at once changes from an ophthalmic to an entomologic one. However, an ophthalmologist may be the first to be consulted by an anxious mother, and he may miss the condition if he is not careful.

An anatomic study of the stout second and third pairs of legs of the insect clearly explains why the louse selects the relatively thicker eyelashes and discards the thinner hairs of children. Although scalp infestations by Phthirus pubis, apparently are observed infrequently in India, one should not overlook the hairs of scalp. Heavy growths of hair should always be examined (Goldman).

Although I have had no personal experience with the efficacy of pyrethrum ointment, I believe it worth trying in cases of Phthiriasis palpebrarum. It is worth remembering that skin sensitivity may develop to the bite, dejecta, and dead bodies of the lice (Phthirus) in treating cases of intractable blepharitis. Biomicroscopic examinations are, of course, better for watching the development of the "blue-spots" which are said to be characteristic of the Phthirus bite.

Summary

Phthiriasis palpebrarum has been defined and described. Its anatomy, biology, control, and statistics are quoted. Children suffer more frequently. Infestation of the scalp may accompany the condition, though presence of lice does not prove that it is the cause of blepharitis. A dermal hypersensitivity in the form of blue spots may develop. Ordinarily the louse is not a carrier. Treatment with pyrethrum ointment (1:8) is suggested.

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I wish to convey sincere thanks to Dr. S. M. Ghosh (Department of Entomology, School of Tropical Medicine, Calcutta), who has very kindly placed valuable data and unpublished records of Phthiriasis palpebrarum at my disposal. I also convey deep gratitude to the artist, Sri A. Das Gupta, for his excellent drawings.

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THE ARMED FORCES EYE FIELD CHEST*

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The refinements of modern medical practice are increasingly dependent upon the availability of complicated and expensive diagnostic and therapeutic equipment. In ophthalmology, especially, recent advances involve the use of electronic and optical devices of great size, weight, and cost.

This development poses a problem for military surgeons in general and for the military ophthalmologist in particular. The anxiety to provide highly specialized care for the sick and wounded in forward combat areas must be tempered by the realization that bulky, heavy, easily damaged equipment is worse than useless in the field. One can easily imagine an army overburdened with apparatus to the point of ineffectiveness. Nevertheless, the benefits of present-day diagnosis and treatment must be provided for the serviceman. It is the purpose of this paper to report on the development of a set of compact, sturdy, lightweight instruments for use by military ophthalmologists in medical field installations.

For the World War I ophthalmic surgeon, the situation was far less complicated. Some use was made of the X-ray and portable magnet in the localization and removal of intraocular metallic foreign bodies. However, a large portion of perforating wounds of the eyeball were best treated by enucleation for fear of sympathetic ophthalmia. Retinal detachment surgery was unknown. General use of the slitlamp and self-illuminating ophthalmoscope was yet to come. Only the larger military hospitals were furnished with equipment for refraction. The case of surgical instruments issued to Army ophthalmologists during World War I is pictured in Figure 1.

World War II saw the increased utilization of medical and surgical specialists. By that time, the ophthalmologist made routine use of the slitlamp, electric retinoscope and ophthalmoscope, surgical diathermy, and visual-field testing apparatus.

Better training made for better diagnosis

Fig. 1 (King and Fair). Set of surgical instruments issued to World War I ophthalmic surgeons (incomplete).

* From the Ocular Research Unit, Walter Reed Army Medical Center.

Fig. 2 (King and Fair). Case of eye instruments issued in World War II.

and treatment. This was reflected in the many complaints that arose from military oculists at the difficulty of obtaining adequate equipment, especially in medical installations overseas. The value and care of specialized ophthalmic devices were little understood by supply personnel. Diagnostic apparatus was particularly scarce. The situation was only partially relieved by much ingenuity and improvisation. Figure 2 demonstrates the standard set of surgical instruments available in some field units during this period.

In the Korean conflict, the ophthalmologist suffered again for lack of readily available supplies. Distances were great and movements rapid. Eye surgeons at the front were constantly hampered by incomplete facilities, a situation which was fortunately counterbalanced by the availability of rapid air evacuation to large hospitals in the rear. Even so, much definitive eye surgery was necessarily performed in forward areas. The experiences gained in Korea accelerated the development of the eye surgeon's field chest to be described.

In the modern military field hospital, the ophthalmologist will find many of his requirements already furnished. Electric power is provided by gasoline motor-driven generators. The basic surgical instrument set of the hospital includes operating room necessities in the way of lights, sterilizers, and linens. This simplifies the outfitting of the eye surgeon to the point where only the instruments and drugs peculiar to his specialty need be considered.

The new Armed Forces eye field chest employs the standard No. 5 chest, an aluminum bivalve container 30 by 16 by 18 inches in size (fig. 3). Into one valve of the chest has been fitted a series of sliding aluminum drawers, some with removable trays.

A most important consideration has been the ability of the containers to withstand physical strains that go with transportation over long distances in every manner of conveyance in time of war. Some means of securely packing sharp instruments and delicate optical devices was required. For this purpose, foam rubber padding and spring clips were employed. Replaceable cataract, keratome, and Lundsgaard blades together with universal handles eliminate the probability of damage to conventional sharp instruments of this type.

Fig. 3 (King and Fair). New Armed Forces eye field chest.

In the selection of instruments, size and weight have been deciding factors. Thus the compound rotating prism was chosen over the prism bars or loose prisms and the medium-size battery handle over the larger model for ophthalmoscope-retinoscope-transilluminator combination.

As presently planned, the chest of instruments and drugs provides for the establishment of a complete one-man eye clinic together with equipment to perform any eye operation that might be required in traumatic cases. Figure 4 demonstrates the abbreviated trial lens set, trial frame, occluder, near vision test card (imbedded in plastic), rotary prism, and ophthalmoscope and retinoscope set. A filler, electric cord, and small transformer convert the ophthalmoscope or retinoscope from batteries to 110v-60 cycle alternating current.

Three drawers of the chest contain surgical instruments. One of the drawers is shown in Figure 5. Where possible, more than one modification of certain instruments is included in order to satisfy widely varying tastes. For example, both Castroviejo and McGuire corneal scissors are provided in both right and left form.

Small items of equipment such as sutures, dressings, and drugs fill another three drawers. The carrying case of the small Lancaster

Fig. 4 (King and Fair). Refracting equipment contained in top drawer of Armed Forces eye field chest.

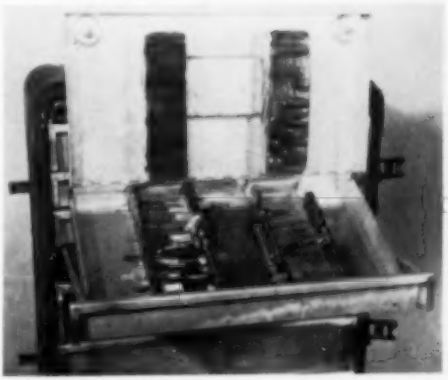

Fig. 5 (King and Fair). One of three drawers containing surgical instruments which are held in place by foam-rubber padding and adjustable spring clips.

hand magnet was cut down in size to fit a lower drawer (fig. 6). The bottom drawer (fig. 7) holds the orbital implant set, a chin rest used interchangeably with slitlamp, tangent screen and perimeter, 18 color-vision testing plates, and a tonometer (latest improved Schiøtz).

Many items required redesigning or invention. Examples are the lightweight folding perimeter (fig. 8), the miniature slitlamp* (fig. 9), the orbital implant set, the carrying case for hand magnet, the muscle light, tangent screen of noncreasing nylon, and the accommodation measuring tape. A small rugged

* American Optical Company development.

Fig. 6 (King and Fair). Drawer containing hand magnet.

Fig. 7 (King and Fair). Bottom drawer of field chest, containing chinrest, orbital-implant set, and tonometer.

lens measuring device has yet to be developed.

After numerous revisions and practical trials including a field trip to Korea, the following list of items has been chosen for inclusion in the field chest.

Adapter and electrode set, eye surgery (retinal detachment set); applicators, cotton tipped; atropine sulfate ophthalmic ointment (one percent).

Benzethonium chloride tablets; blade, cataract, Graefe (Beaver), size 2; blade, keratome, angular, Jaeger (Beaver), medium; blade, keratome, angular, Jaeger (Beaver), small; blade, operating, Lundsgaard (Beaver); blade, operating knife, Bard-Parker, No. 11; blade, operating knife, Bard-Parker, No. 15; bottle, irrigating, eye, Ziegler.

Fig. 8 (King and Fair). Folding nylon perimeter and chinrest. The chinrest is also used for slitlamp and tangent screen.

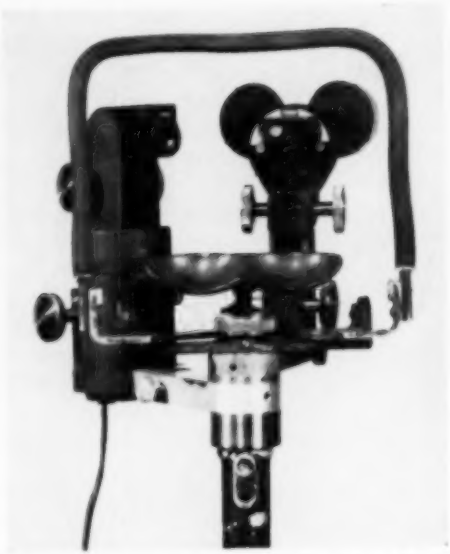

Fig. 9 (King and Fair). Miniature slitlamp (weight approximately nine pounds) in position for use.

Caliper, Castroviejo; cannula, cyclodialysis, Castroviejo; cautery, Wadsworth-Todd; chest, field, No. 5, 30 by 18 by 16 inches; chin rest, for slit lamp, perimeter, and tangent screen; clamp, table; clamp, towel, Backhaus; cord, electric, extension, 7.5 feet; curette, chalazion, Meyhoefer, sharp, medium; curette, chalazion, Meyhoefer, sharp, small.

Depth perception apparatus, portable, Verhoeff; dilator, lacrimal punctum, Nettleship-Wilder; dressings, eye, cotton, pad; dropper, medicine sterile, plastic disposable; drum, test.

Electrode, Guyton, set of six in case; epinephrine injectable, 1:1,000; erisophake, Bell, with rubber bulb.

Fluorescein sodium, 0.3 gm., U.S.P. dry powder; forceps, advancement, Prince; forceps, capsule, curved, Arruga; forceps, capsule, curved, Schweigger; forceps, chalazion, Lambert; forceps, cilia, Douglas; forceps, dressing, straight; forceps, eye, conjunctival, curved; forceps, eye, dressing, straight; forceps, eye, fixation, straight, Graefe; forceps, eye, fixation, straight, nonmagnetic; forceps, hemostatic, mosquito, curved; forceps, hemostatic, mosquito, straight; forceps, iris, curved, Graefe, 2.5 inch, mouse tooth; forceps, iris, Gill-Hess, teeth down; forceps, suture, St. Martin-Castroviejo; forceps, utility, Nugent, smooth jaws; forms: Spectacle order forms, WD AGO 8-41, 100 (ophthalmologic examination), prescription blanks, standard, central field of vision charts.

Goggles, opaque, pinhole, Lindner.

Handle, operating knife, Bard-Parker, No. 3; handle, operating knife (Beaver); holder, needle,

eye, Kalt; homatropine hydrobromide, 0.324 gm. (5.0 gr.); homatropine hydrobromide (two-percent ointment), ophthalmic; hook, iris, blunt, Tyrell; hook, iris, sharp, Tyrell; hook, strabismus, Graefe, medium; hook, strabismus, Jameson; hyaluronidase, 25 gm.

Irrigator, anterior chamber, Dougherty.

Knife, eye, discission, Wheeler; knife, eye, needle, Ziegler, 6 mm.

Lamp, alcohol, metal; lamp, slit, field type; lamps, spare; lensometer, field type; lens set, trial, field; light, examination; light, muscle, test, small; list of all items, catalog numbers, etc., with instructions for use and reordering; loop, lens, Wilder, serrated; loupe, binocular, Beebe.

Magnet, eye, Lancaster, small (modified); membrane, test drum.

Needle, hypodermic, 22 gage, one inch; needle, hypodermic, 25 gage, two inch; needle, hypodermic, 26 gage, 0.5 inch; needle, suture, eye, one-half circle, cutting edge, size 2; needle, suture, eye, corneal, Kalt, three-eighths circle, taper point, 18 mm.

Occluder, eye, handle, black; orbital implant, assorted set.

Patch, eye, black, silk-lined; perimeter, canvas, folding; phenylephrine hydrochloride (10-percent solution) (neosynephrine); pick, fixation, Burch; pilocarpine nitrate (two-percent ointment), ophthalmic; plaster, adhesive (three inch); plate, eyelid, Jaeger, Lucite, clear; pliers, snipe nosed, 5.25 inch; prism, rotary, Hughes; probe, lacrimal, William, set of eight.

Repositor and probe, iris, Knapp, 5.25 inch; retractor, Arruga, plastic, wide (15 mm.); retractor, eye, lacrimal sac, Meller; retractor, eyelid, Desmarres, nonmagnetic; rule, optical, 15 cm.; rule, refracting, Prince (steel tape).

Scissors, bandage, Lister, 7.25 inch; scissors, corneal, Castroviejo, right; scissors, corneal, Castroviejo, left; scissors, corneal, McGuire, right; scissors, corneal, McGuire, left; scissors, enucleation, full curved; scissors, iris, angular, 4.25 inch; scissors, iris, spring handle; scissors, tenotomy, curved, Stevens; scissors, tenotomy, Westcott, spring handle; screw, temple, regular; screw, temple, repair; screwdriver, reversible blade; Set: ophthalmoscope, retinoscope, and transilluminator combination with medium-size battery handle, filler, and cord for use with 110v A. C. and spare bulbs; shield, eye, aluminum, Fox; sodium sulfacetamide ophthalmic ointment, 30 percent; spatula, eye, cyclodialysis, Elschnig; spatula, eye, flexible, 5.25 inch; spatula and hook, iris, Knapp, silver; speculum, eye, nonmagnetic, Guyton-Park; speculum, eye, nonmagnetic, Weeks; spud, eye, double-ended, needle and gouge; suture, silk, braided, size 4-0, 25 yards; suture, silk, braided, size 6-0, 25 yards; suture, silk, braided, single-armed, size 4-0; suture, silk, eye, braided, double-armed, size 6-0; suture, surgical gut, boilable, mild treatment, double-armed, size 6-0; suture, surgical gut, boilable, type A, plain, double-armed, size 3-0; suture, surgical gut, boilable, type B, mild treatment, double-armed, size 4-0; syringe, Luer, 2.0 cc.; syringe, needle lock, 5.0 cc.; syringe, Luer, 10 cc.; syringe, Luer, tuberculin, 1.0 cc.

Tangent screen; Terramycin-polymyxin ointment, ophthalmic; test object, Berens, pocket outfit; tetracaine ophthalmic ointment, 0.5 percent; textbook, *The Eye and Its Diseases*, 2nd edition, Berens; Tonometer, Schiøtz, improved; transformer, for slitlamp; transformer, small, for use with ophthalmoscope and retinoscope, with cord; tray, instrument, aluminum, nesting; trail lens frame.

Vision test card, white background, distant vision, Snellen; vision test card, illiterate E chart; vision test card, near vision, related letters, Jaeger; vision test set, color vision, 18 pseudo-isochromatic plates.

Wrench, for Beaver instrument handles.

Fully a year for the writing of specifications, contract letting, manufacture, and assembly will be required before the field chest will become available for use. Development of newer and better equipment is to continue. Present goals are a field-type lens-measuring instrument and lightweight surgical diathermy and foreign-body locator machines.

Summary

1. In the past, military ophthalmologists have been handicapped by the lack of suitable equipment for use in medical installations in the field.

2. The recently developed Armed Forces Eye Field Chest is presented. This is a compact set of lightweight diagnostic and surgical instruments, including miniature slitlamp, folding perimeter, and portable electromagnet.

Walter Reed Army Hospital (12).

LACRIMAL FISTULA*

A SURGICAL TECHNIQUE BASED ON DACRYOCYSTOGRAPHY

BENJAMIN MILDER, M.D.
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In common with most diagnostic adjuncts, the more one employs dacryocystography (radiography of the lacrimal passages), the more information one can derive from this method. The value of such radiographic study is strikingly illustrated by the following case of fistula of the lacrimal sac. In approaching this surgical problem, use was made of all available clinical information, especially that provided by the dacryocystogram.

The case history presented here is of interest for several reasons:

1. It illustrates the coexistence of lacrimal-sac diverticulum and lacrimal fistula.

2. It demonstrates the relatively uncommon situation in which a lacrimal fistula persists despite patency and normal drainage function of the nasolacrimal duct.

3. It illustrates the need for the dacryocystogram in demonstrating details of the pathologic process and in defining the problem.

4. It shows how the individual surgical technique for this case was dependent on these radiographic findings.

CASE HISTORY

R. K.,† a youth, aged 18 years, presented himself with the chief complaints of (1) burning of the eyes; (2) tearing of the left eye since the age of six years.

History. The patient had noted burning of the eyes and a tendency to become sleepy when riding busses in recent months. He had no visual complaint and had never worn glasses.

Past history. The patient reported having had an operation on his "left eye," at the age of six years, at a local hospital. Tearing has been present on the left side ever since. Further questioning revealed that the tears were coming from a small "hole" on the left lower eyelid. No further details of the history could be obtained. A report from the hospital merely listed the patient as having had an "abscess of the left upper (sic) eyelid." There had been no examination or treatment of the eyes since that time.

Vision was: R.E., 20/20+; L.E., 20/20+.

Examination showed:

External. The right eye was entirely normal. On the left side, there was a small fistulous opening in the skin of the left lower lid, six mm. temporal to and 10 mm. below the nasal canthus. A slight amount of induration surrounded this opening.

From time to time a small bead of clear fluid, apparently tears, appeared at this opening, and pressure above the opening produced a free flow of tears onto the face. From the fistulous opening, one could feel an arcuate subcutaneous scar extending upward toward the medial canthal ligament.

The left lower lid punctum was slightly irregular, not overly large and was in good position relative to the globe. There was no epiphora and no deformity or bulging was noted in the region of the lacrimal sac.

Ophthalmoscopic. The ocular media, optic discs, and retinas were entirely normal.

Dacryocystogram. A preliminary irrigation of the left nasolacrimal passage was performed, using saline. The solution was instilled through the lower punctum and there was an immediate free flow onto the face through the fistulous opening. When digital compression was made over this area, the saline flowed equally freely into the nasopharynx.

* From the Department of Ophthalmology and the Oscar Johnson Institute, Washington University School of Medicine.

† Presentation of this patient was authorized by the Labor Health Institute of Saint Louis.

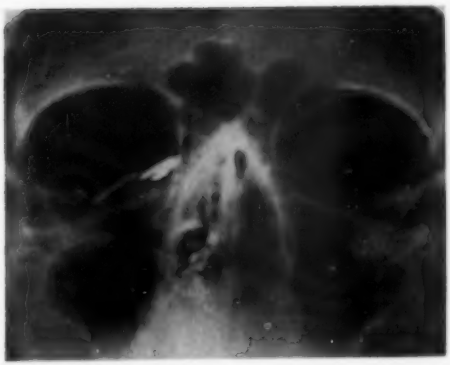

Fig. 1 (Milder). Preoperative dacryocystogram. Posteroanterior view.

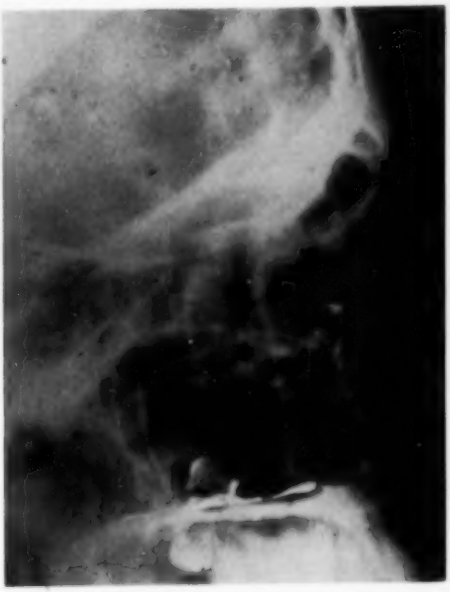

Fig. 2 (Milder). Preoperative dacryocystogram. Lateral view.

Radiograms of the left lacrimal passages were made, employing Pantopaque after the technique previously described.* The posteroanterior film showed a broad jagged opaque shadow extending inferior and temporal from the region of the medial canthal ligament (identified by the outline of the eyelid margins).

This shadow, broader in its nasal half, measured about 20 mm. in length (fig. 1). Little or no dye was seen in the sac and nasolacrimal duct, but a large accumulation of the dye was found in the nasopharynx, proving the patency of the system. This patency is better demonstrated in the lateral view (fig. 2). The absence of residual dye in the passages demonstrated that the drainage apparatus was not only patent but also functioning.

The dacryocystogram was repeated, after blocking the fistulous opening with a No. 4 lacrimal probe. At this time, the patient reported that he could taste the Pantopaque after five to six minims had been instilled through the inferior lid punctum. The probe was introduced for a distance of 22 mm. before reaching a bony obstruction above the medial palpebral ligament—apparently the anterior lacrimal crest. The posteroanterior film this time showed only the distended nasal half of the fistula, overlying the region of the sac.

Diagnosis. From the position of the radiopaque shadow, its outline, and the direction of passage of the probe, it was concluded that the fistulous tract was an extension of a broader diverticulum of the lacrimal sac, probably arising from the anterior wall of the sac.

Operative procedure. Anesthesia was effected with intravenous sodium pentothal. One lacrimal probe was placed in the fistula, and another into the sac through the lower punctum. A grating together of the two probes could be felt over a fairly broad contact area, confirming the radiographic impression of a broad-base diverticulum.

An arcuate incision was made over the the fistulous tract, from its mouth to the anterior lacrimal crest at the ligament. The lower half of the fistula was then dissected (around the probe), and after elevating it, one could note that the fistulous tract was connected to the tear sac on its anterior aspect by means of a large, dilated saccule.

* Milder, B., and Demorest, B. H.: Dacryocystography: I. The normal lacrimal apparatus. Arch. Ophth., **51**:180-195, 1954.

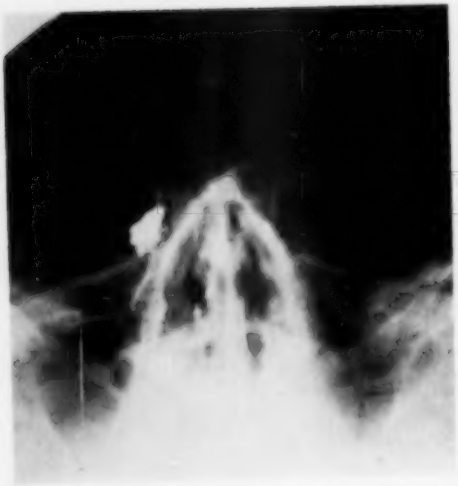

Fig. 3 (Milder). Postoperative dacryocystogram. Posteroanterior view.

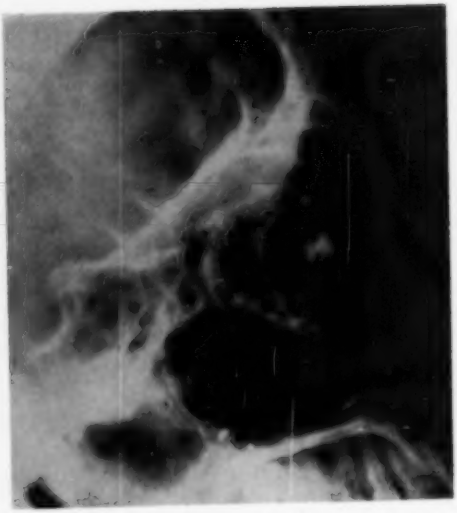

Fig. 4 (Milder). Postoperative dacryocystogram. Lateral view.

The area of attachment was cleaned and exposed. A pursestring suture was placed about the broad base, using 5-0 plain catgut. The fistulous tract was amputated and the stump inverted into the sac, tying the pursestring suture. A single imbricating suture was placed over the area of the pursestring closure. There was no bleeding.

The skin was closed with a running 4-0 black silk subcuticular suture. Sulfathiazole ointment was instilled into the conjunctival sac and a monocular pressure dressing was applied. The patient tolerated the procedure well. It was noted that, at the termination of the operation, a probe placed in the lower canaliculus found its way into the sac at a level several mm. below the area of closure of the fistula.

Postoperative course. The postoperative course was uneventful except for a pinpoint draining site, at the midpoint in the skin wound, when the subcuticular suture was removed. This spot was touched with phenol and healed uneventfully. Following recovery, the patient had no epiphora, the fistula remained closed and the lacrimal passage irrigated freely.

One month after the operation, dacryocystograms were repeated (figs. 3 and 4). Both the posteroanterior and lateral views showed that the sac remained moderately dilated and atonic, and in the lateral view particularly it could be seen that the amputated stump of the diverticulum had persisted. Presence of much dye in the nasopharynx confirmed the patency.

Comment

From the standpoint of disease of the lacrimal drainage apparatus, this patient is interesting because of the persistence of a lacrimal fistula for 12 years in the presence of a patent and functioning drainage system.

It is important to emphasize that, in this somewhat uncommon case, it was possible to anticipate the findings at the operating table by use of dacryocystography. Thus, the broad-based diverticulum was no surprise, nor was the anterior attachment to the lacrimal sac. The radiograms, then, were indispensable in the management of this patient. This case illustration could well be taken as a plea for more general use of dacryocystography, even when the lacrimal problem seems to be a simple and obvious one.

539 North Grand Avenue (3).

TREATMENT OF TRACHOMA WITH ERYTHROMYCIN*

A PRELIMINARY REPORT OF 21 CASES

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INTRODUCTION

This report concerns the treatment of 21 patients on the Navajo Indian reservation. All of the patients were Navajo children enrolled in government boarding schools and 10 of the children had been treated for their trachoma by the public health nurse with a course of oral sulfadiazine and local sulfathiazole ointment for 12 days without any improvement in their condition. The others had received no therapy for their trachoma before being referred into the medical center for treatment.

ETIOLOGY OF TRACHOMA

In 1907, Halberstaedter and von Prowazek[1] described the epithelial inclusion bodies of trachoma. In 1932, the etiology of trachoma with reference to Bacterium granulosis was discussed by Ida Bengtson.[2] Finally, in 1935, the conclusion was advanced that the inclusion bodies of trachoma were actually intracellular colonies of the virus which could be the cause of the disease.

By the use of graded colloidion filters with small filtration areas it was possible to obtain bacteria-free filtrates containing the elementary bodies.[3] Here again it was suggested that the previous inactivity of the trachoma filtrates might be due to the absorption of the virus by the filter itself.

Earlier Busacca[4] had reported the occurrence of small bodies in the conjunctival epithelial cells and in the mononuclear cells of the trachoma follicles. Again in 1937, Busacca[5] reported the occurrence of these small bodies and advanced the thought that they might be the cause of trachoma and were in reality a rickettsia. His work was done with impression smears and the bodies were seen in the epithelial cells, follicle cells, and even in a free state between the cells.

Confirmation of his work came from Cuneoid and Nataf[6] who referred to small rickettsialike bodies obtained from expressed follicular material.

In 1938, Thygeson[7] obtained material from these investigators but felt that the bodies represented cytoplasmic debris and nuclear extrusions. By 1938 it was fairly well established by Thygeson that the causative organism in trachoma was a virus and that the transition from initial body to elementary body within the epithelial cell actually represented part of the life cycle of the virus itself.[8]

METHOD OF STUDY

All of these children had preliminary conjunctival scrapings and thorough external examinations, including biomicroscopy. The presence of follicles, papillary hypertrophy, conjunctival reaction, and pannus together with any scarring was noted. The degree of pannus was measured in mm. from the limbus. All of these children were classified as to the stage of their trachoma according to the MacCallan classification.

Those children showing only the engorged type of conjunctival injection were classified as cases of Stage I trachoma. Those showing follicular hypertrophy confined to the upper tarsal conjunctiva were classified as Stage IIa, and those showing papillary hypertrophy confined to the same area as Stage IIb. Early cicatricial stage III included any case where there was a pannus confined to the upper lim-

* From the Department of Ophthalmology, Fort Defiance General Hospital, Fort Defiance, Arizona. Acknowledgement is made to Dr. L. E. Josselyn of Abbott Laboratories, who supplied the Erythromycin for this study, and to Mrs. Jean Mannagh of the Doheny Eye Foundation, who helped with the interpretation of these scrapings.

bus or corneal area, together with subepithelial infiltrates, punctate staining, and ulcerations. Stage V included the group falling into the inactive stage with scarring of the tarsus, and so forth. This last group was not considered in this series.

Follow-up examinations were conducted every two days while the children were on therapy and included both scrapings and external examination.

Treatment

The 21 children were all treated with Erythromycin administered orally in a dose of two to three mg. per pound of body weight given at four-to-six hour intervals. No local medication was used. Throughout the course of therapy, weekly blood counts were taken and any signs of toxicity were carefully watched for, although no untoward reaction developed in any of the patients treated.

Results of therapy

The results of therapy with Erythromycin were quite startling with marked improvement in both the clinical signs of the disease and a fairly rapid return of the conjunctival cytology to normal. The clinical response was tabulated as to decrease in pannus measured in mm., decrease in the number of follicles, and decrease in the conjunctival reaction.

Since individual variations easily occur among various observers especially with their clinical interpretation of a disease, more stress has been placed on the conjunctival cytology than on the clinical signs of regression. Many cases appear clinically to respond to a drug when actually it is the secondary infection which has been cleared and the cytology of the trachoma remains unchanged.

The characteristic cytology of trachoma,

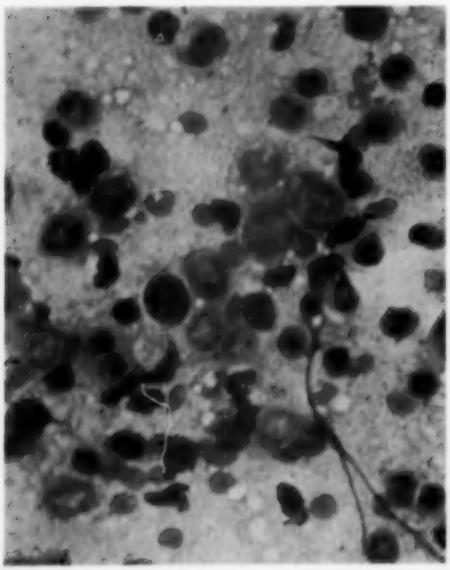

Fig. 1 (Button). *Case 1.* Stage III trachoma before treatment. This particular field shows the abundance of large poorly staining follicle cells, together with a predominantly lymphocytic infiltrate. Although not illustrated, there were many cytoplasmic inclusion bodies located in the epithelial cells.

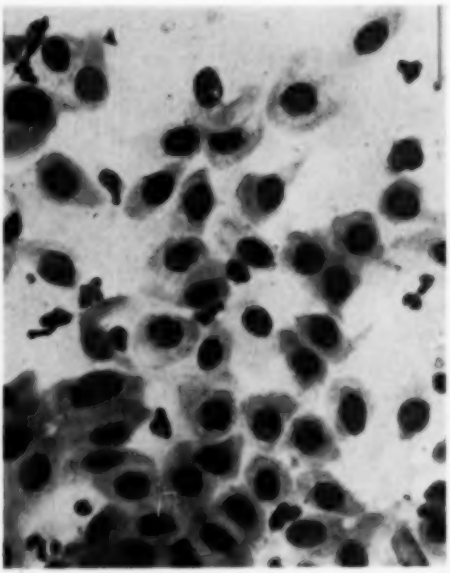

Fig 1a (Button). *Case 1,* four days after treatment. This slide shows the disappearance of follicle cells and lymphocytes and the return of the cytology to normal.

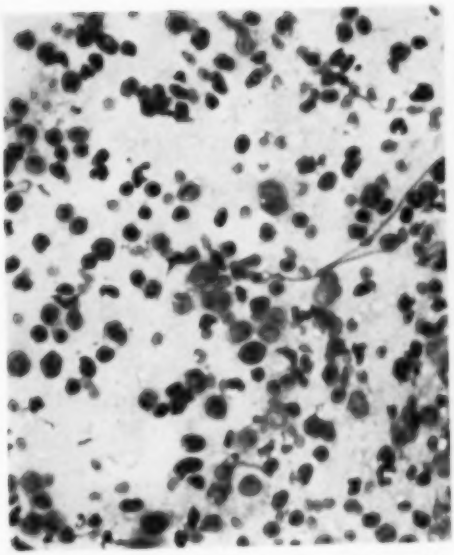

Fig. 2 (Button). *Case 2.* Stage I trachoma before treatment. This view was taken under low power to show a more extensive field. Again can be noted the follicle cells, lymphocytic infiltrate, poorly staining epithelial cells, and one large macrophage in the upper left-hand corner of the photo. This photo shows the over-all picture of necrosis.

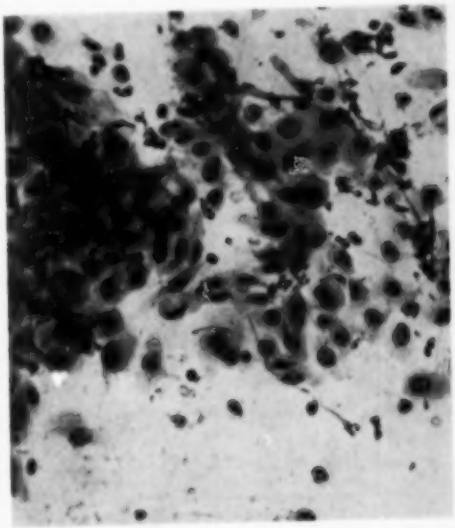

Fig. 2a (Button). *Case 2,* taken three days after therapy had been instituted. The conjunctival cytology has returned to normal.

briefly, consists of large, poorly staining epithelial cells containing inclusion bodies,[9] large poorly staining follicle cells or lymphoblasts which are the most abundant cells of the trachomatous exudate, and an intensive lymphocytic infiltrate. Many plasma cells and characteristic large macrophages called Leber cells also form part of the diagnostic pattern.

The photomicrographs (figs. 1 through 4a) represent various stages in the conjunctival cytology while the patient was on treatment. For the sake of brevity only four characteristic cases were used for illustrative purposes. The cases were picked to represent Stage I, Stage II, and Stage III trachoma.

The clinical findings, as well as the conjunctival cytology, are tabulated in Table 1 according to the days of treatment. In general, it was found that there was a lag between the return of the conjunctival cytology to normal and the disappearance of clinical signs. Often the follicles and the pannus remained long after the cytology had re-

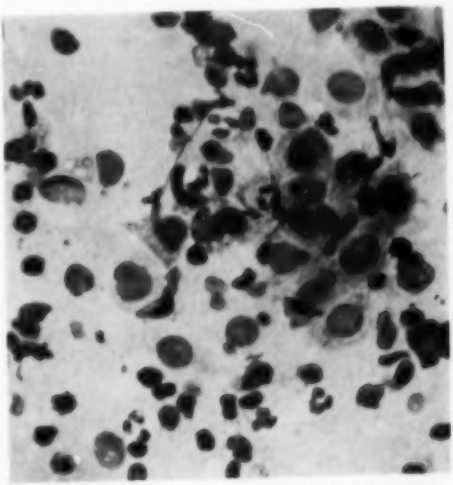

Fig 3 (Button). *Case 5.* Stage III trachoma before treatment. The group of epithelial cells in the center of the photomicrograph show the presence of many cytoplasmic inclusion bodies. There was also a lymphocytic infiltrate and the presense of follicle cells.

TABLE 1

CLINICAL FINDINGS AND CONJUNCTIVAL CYTOLOGY IN 21 CASES OF TRACHOMA TREATED WITH ERYTHROMYCIN

Case	Age (yr.)	Stage	Treatment	Duration of Treatment (days)	Decrease in Pannus (mm.)	Decrease in Follicles	Decrease in Conjunctival Reaction	Cytology During Treatment		
								1–4 Days	5–9 Days	10–14 Days
1	7	III	Erythromycin 1.0 O.D. 1.0 O.S.	12	None present	Complete	Complete	Neg. 4 days		
*2	8	I	Erythromycin	8	None present	None present	Complete	Neg. 3 days		
*3	11	I	Same	15	None present	None present	Complete		Neg. 5 days	
*4	9	I	Same	15	None present	None present	Complete	Neg. 3 days		Neg. 12 days
5	12	III	Same	18	No decrease	None present	Complete		Neg. 5 days	
6	8	IIa	Same	13	None present	Complete	Complete	Neg. 3 days		
*7	10	IIa	Same	15	None present	Complete	Complete	Neg. 4 days		
*8	8	III	Same	15	No decrease	Slight	Complete	Neg. 4 days		
9	6	IIa	Same	15	None present	Moderate	Complete		Neg. 5 days	
*10	10	IIa	Same	15	None present	Complete	Complete		Neg. 5 days	
11	6	III	Same	15	No decrease	Moderate	Complete		Neg. 5 days	
*12	7	III	Same	15	1.0 O.S. only	Complete	Complete		Neg. 5 days	
13	8	IIa	Same	15	None present	Complete	Complete		Neg. 5 days	
*14	7	III	Same	15	No decrease	Complete	Complete		Neg. 5 days	
*15	6	I	Erythromycin	15	None present	None present	Complete		Neg. 5 days	
*16	9	III	Same	15	No decrease	Slight	Complete		Neg. 5 days	
17	10	III	Same	5	No decrease	Complete	Complete		Neg. 5 days	
18	6	IIa	Same	5	None present	Complete	Complete		Neg. 7 days	
19	10	IIa	Same	14	None present	Moderate	Complete		Neg. 5 days	
20	10	III	Same	15	No decrease	None present	Complete		Neg. 7 days	
21	7	IIa	Same	15	None present	Complete	Complete			

* These 10 children had been previously treated with oral sulfadiazine (one gr. per lb. per day) and local sulfathiazole ointment without any improvement in the trachoma for a period of 12 days.

turned to normal. It was found that at least 12 days were required to effect a cure and cases in which the drug was discontinued before this time often recurred, although the cytology had been normal several days before the cessation of therapy. Usually the inclusion bodies were the first to disappear followed by a disappearance of follicle cells, macrophages, and lastly lymphocytes and plasma cells in that order.

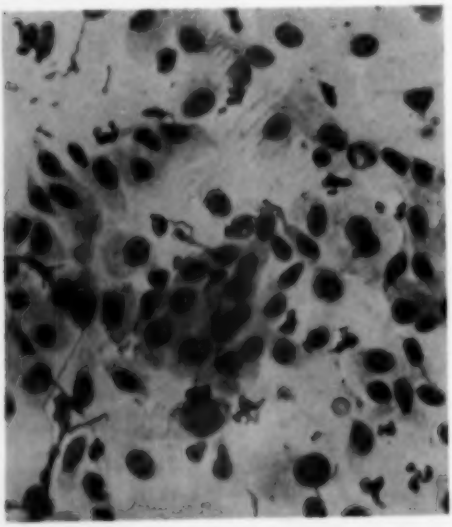

Fig. 3a (Button). *Case 5*, 12 days after therapy had been instituted, again showing the return of the cytology to normal.

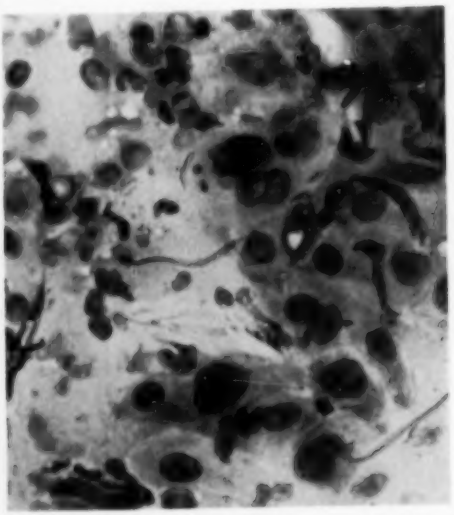

Fig. 4 (Button). *Case 6*. Stage IIa trachoma. Here again can be seen several epithelial cells with cytoplasmic inclusion bodies grouped near the nucleus. Also again can be seen many lymphs and follicle cells.

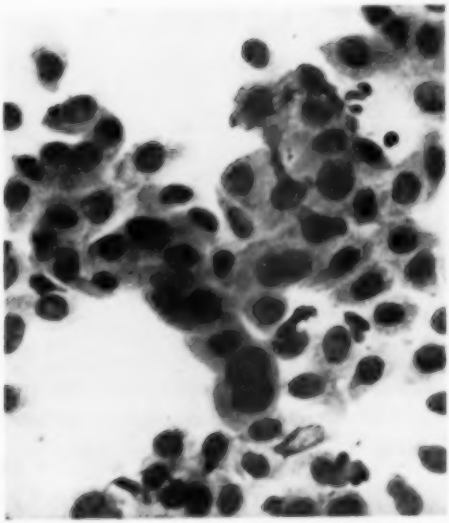

Fig. 4a (Button). *Case 6*, five days after treatment showing again the return to normal cytology.

Summary and Conclusions

1. The treatment of 21 cases of trachoma* with Erythromycin has been presented.

2. Although the number of cases is much too small to be conclusive, Erythromycin appeared to be effective in the treatment of Stage I, Stage, II, and Stage III trachoma.

3. Four cases of Stage I trachoma with positive cytology became negative after an average of four days' treatment.

4. Seven cases of Stage II trachoma reverted to normal cytology after an average of 4.9 days' treatment.

5. Ten cases of Stage III trachoma reverted to normal cytology after an average of 5.7 days of treatment.

6. At least 12 days of therapy were recommended since recurrences did occur when therapy was discontinued before this time.

7. Ten cases of trachoma which were unresponsive to oral and local sulfonamide therapy responded to Erythromycin.

8. A review of the etiology of trachoma has been presented.

419 North Newport Boulevard.

I wish to express my appreciation for the excellent assistance given me by the U. S. Public Health nurses and for their co-operation in treating these patients on an out-patient basis.

* Since this paper was submitted for publication, the following results have been obtained:

1. During an eight-month follow-up period, none of the 21 cases herein presented, exhibiting all stages of trachoma from acute Stage I to early cicatricial Stage III, have recurred.

2. Four additional Stage III trachoma cases, exhibiting pannus in addition to minimal early tarsal scarring, were placed on therapy with oral Erythromycin, with complete return to normal cytology within one week.

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NOTES, CASES, INSTRUMENTS

ANTERIOR-SEGMENT PHOTOGRAPHY*

A SIMPLE, INEXPENSIVE TECHNIQUE: ADDITIONAL REPORT

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In the March, 1953, issue of THE AMERICAN JOURNAL OF OPHTHALMOLOGY, a simple, inexpensive technique for photographing the external eye was presented.[1] This method was not applicable for detailed anterior-segment photographs and the following additions were devised for the original instrument. The new modifications enable one to photograph diseases of the lids, conjunctiva, cornea, iris, and lens with greater magnification, as well as the previously listed diseases of the external eye such as pre- and postoperative strabismus cases, and so forth.

The technique still provides stability of the apparatus and patient, accuracy of aim, good depth of focus, and inexpensive, nonirritating illumination in a rapid, easy, efficient mode of operation.

The following is a brief description of the orginal apparatus with the additional supplements.

APPARATUS (fig. 1)

1. *Slitlamp table with chinrest and headrest.* The Bausch and Lomb Universal slitlamp table is used. The chin- and headrest aid in stabilizing the patient and can be elevated or depressed to the desired height to maintain alignment.

2. *Arm.* As described in the original article.[1]

3. *Light crossbar.* This contains the light source and supports the camera as originally described. The following additions have been made for anterior-segment photography.

Fig. 1 (Abrahamson). Slitlamp table and apparatus.

a. Swivel-joint socket. To permit rotation of the lights to a more vertical position.

b. Light source with reflectors. Two 100-watt, 120-volt bulbs are used.

The reflectors increase the intensity of illumination which is adequate and nonirritating as well as inexpensive.

c. Extension bar. This is a piece of wood 9.5 by 1.5 by 1.125 inches extending toward the patient. It is held firmly to the light crossbar by two 0.25-inch screws and bolts, which are easily tightened or loosened by hand.

d. Rider. This is a rectangular piece of steel 2.0 inches wide and 0.125-inch thick which has been molded to conform with the shape of the extension bar. A hole has been drilled in one side so that the camera can be attached to it. The rider can slide along the extension bar to and away from the eye for the desired focal length.

4. *Camera.* I use a Praktica; however, an Argus, Leica, Contax, Kine-Exacta, or any type may be used.

a. *Extension tubes.* These are inexpensive and provide depth of focus permitting photography of the eye from 2.5 to 11.5 inches away.

b. *Extension cable.* This aids in stabilizing the camera.

c. *Film.* The camera is always loaded with

* From the Department of Ophthalmology, Cook County Hospital, Chicago, Illinois.

35-mm. Kodachrome type-A indoor film for the original apparatus, unless black and white is desired, then Kodak-Panchromic-X (plus X) is used. For use of the Strobe light unit, one must use outdoor Kodachrome film instead of the indoor type to prevent a blue color to the picture.

Technique

The patient is seated facing the apparatus with his chin in the chinrest and his forehead against the headrest (fig. 2). The arm, crossbar, and extension bar, which are permanently attached, are fastened into place on the slitlamp table as originally described.

The camera, whose speed is at 0.2 second and whose lens aperture is at F5.6, is attached to the rider and the rider placed on the extension bar.

The object is brought into focus by sliding the rider and camera along the extension bar to and from the eye. The patient is observed for blinking, or the eye is held open by the operator, and in a matter of seconds the picture is taken. Figure 3 shows the depth of focus obtained. Only a few minutes are required to mount the apparatus on the slitlamp table and take the picture.

Remarks

1. *Polaroid filter.* An attempt has been made to eliminate glare as well as the light reflex by the use of a Polaroid filter. It is almost impossible to eliminate the light reflex in this manner. Glare can be eliminated but at the expense of depth of focus—a wider aperture must be used.

Fig. 2 (Abrahamson). Photographic technique—apparatus alone.

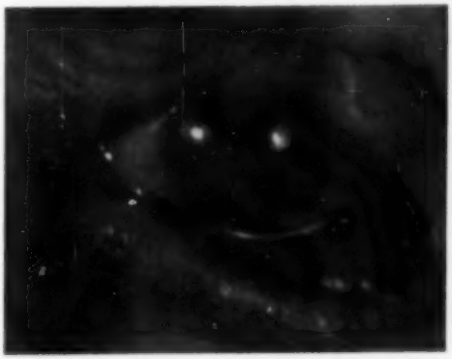

Fig. 3 (Abrahamson). Cicatricial ectropion.

2. *Strobe light.* The use of a Strobe electronic lighting unit, although an added expense, is recommended for more detailed depth of focus. It is easily attached to the apparatus described and is held in the same hand as the extension cable release at a distance of eight to 10 inches from the patient's face with white patients, and four to six inches with Negro patients.

a. *A cardboard shield* with a circular opening, two inches in diameter, is placed over the reflector to cut down the corneal light reflex. (1) A cardboard toilet-paper cylinder inserted over the Strobe bulb and held four inches from the eye failed to produce any smaller corneal light reflex. (2) The Strobe without the reflector, held at six inches from the subject, produces a very small reflex and very even illumination; however, the operator is blinded by the flash unless he avoids looking at the unit.

b. *Ring attachment.* The ring attachment for the Strobe unit and camera was also tested, but again a large, circular corneal light reflex was found to be present. It could not be eliminated, and in many instances obscured the pathologic process present, so this form of Strobe unit for anterior segment photography was abandoned.

Fig. 4 (Abrahamson). Photographic technique—apparatus with Strobe unit.

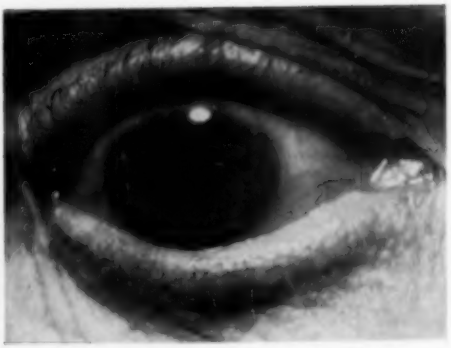

Fig. 5 (Abrahamson). Surgical coloboma.

The recommended exposure is 1/25 second with a lens aperture of between F8 to F11 for dark irises, or F11 for light irises. The anterior segment is focused with the original lighting unit on the cross bar; the lights are then turned off and the picture is taken with the Strobe unit (fig. 4). Figure 5 shows the depth of focus obtained.

3. *Photo flash-bulb unit.* This is an efficient method to produce adequate illumination; however, the following drawbacks should be considered: (1) The need for repurchasing bulbs, (2) the bulbs are cumbersome to carry, (3) the bulbs may not go off or they may break, (4) the light reflex is larger than that produced with the above-described Strobe unit.

Summary

1. A simple, inexpensive technique for photographically reproducing the detailed anterior segment of the eye is described.

2. It is recommended that for more detailed depth of focus a Strobe light unit be used.

3. The method provides stability of the apparatus, accuracy of aim, good depth of focus, and a rapid, easy, efficient mode of operation.

925 Union Trust Building (2).

I wish to express my appreciation to Rimvidus Sidrys, M.D., and Robert Scott for their technical assistance.

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OPTICAL THEORY OF THE MADDOX ROD*

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Although the use of the Maddox rod for routine heterophoria testing is commonplace, its optical principles are poorly described by most sources. Maddox[1] himself did not explain the manner in which an ordinary glass stirring rod (the first Maddox cylinder—1890) distorted a point of light into a line. In his original article Maddox wrote:

"The principle of the test depends upon the property of transparent cylinders to cause apparent elongation of any object viewed through them, so that in looking at a distant flame, with a glass rod before one eye, it appears converted into a long thin line of light, so dissimilar from the flame itself, as seen at the same time by the other naked eye, that there remains practically no desire to unite the two images, whose relative position indicates the conditions of equilibrium in the two eyes."

By 1894, Aiken[2] had devised a multiple Maddox rod, very similar to those manufactured today, in which a number of cylinders are placed side by side. At this time Edward Jackson[3] believed the image seen through a multiple Maddox cylinder consisted of a number of short lines (each the width of the rod forming it), the combination of which produced an interrupted line perpendicular to the cylinder axes.

A similar misconception was held by several present-day ophthalmology residents who were queried on their ideas about the mode of action of the Maddox rod. Residents are often baffled by the fact that the image seen through a Maddox rod is perpendicular to the axis of the cylinder instead of parallel to the axis as an image is projected by a convex cylinder.

The images formed by an optical system containing a cylinder are represented by a conoid of Sturm. One focal line of the conoid is parallel to the axis of the cylinder, with its location determined by the strength of the cylinder (plus whatever spheric strength exists in the optical system).

Figure 1 shows a model of a cylindric lens (M) with this horizontal focal line (1). (L) is the source of light. By the basic laws of optics, in a system containing only a cylinder, the other focal line of the conoid of Sturm, oriented perpendicularly to the axis of the cylinder, is always situated at the source of light. (If this image were not always at the light, its use in testing heterophoria would be invalid.) This is represented by the vertical focal line (V) in Figure 1. Since it is in front of the lens, it is a virtual image. This virtual image may be transformed into a real image (vertical line 2) and may be projected on a screen or on the retina by any sufficiently strong converging lens such as exists in the eye (E). Its length depends on the width of the pupil.

The Maddox rod is an extremely strong cylinder, whose dioptric strength varies with the curvature of the rod put out by the individual manufacturers. One of our rods was

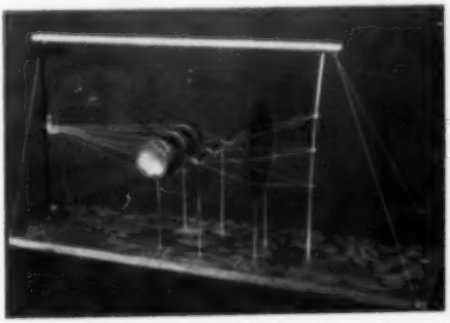

Fig. 1 (Havener and Oleksy). A model of a cylindric lens. (See text for explanation.)

* From the Department of Ophthalmology, University of Michigan Medical School, Ann Arbor, Michigan.

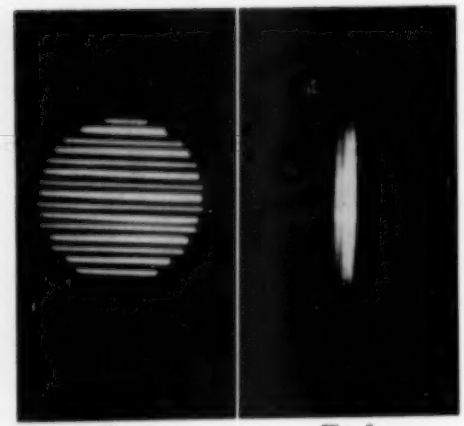

Fig. 2 Fig. 3

Figs. 2 and 3 (Havener and Oleksy). (Fig. 2) A photograph obtained by focusing a camera on a point 6.6 mm. from the Maddox rod. (Fig. 3) A photograph obtained by changing the focus of the camera to the distance of the light source.

measured as approximately +150 diopters. The focal distance of a cylinder of this strength is 6.6 mm.

Both of the focal lines (V and 1) of the conoid of Sturm of the Maddox rod may readily be shown to exist by three methods: (1) Photography, (2) direct observation, (3) projection upon a screen.

1. A camera can be set up to view a light source axially through a Maddox multiple cylinder.

Figure 2 is a photograph obtained by focusing the camera on a point 6.6 mm. from the Maddox rod, and represents the images (focal line 1) formed there by each of the cylinders in the Maddox multiple cylinder.

Figure 3 is a photograph obtained by changing the focus of the camera to the distance of the light source. It represents a group of lines (corresponding to focal line V) formed by each of the multiple cylinders (and by width of the light source).

2. Substitution of the observer's eye for the camera permits visualization of the horizontal or vertical focal lines as shown in the photographs, depending on whether the eye is focused at the Maddox rod or at the light source. The lines parallel to the cylinder axes cannot be seen in clinical usage because they are less than one cm. from the eye, and accommodation is totally inadequate to focus on an image this close.

3. Projection of these focal lines of Sturm upon a screen may be done in a similar manner, substituting a screen for the photographic film, and using lenses of proper strength to make the screen conjugate with the light source, or with the focal line 6.6 mm. in front of the Maddox rod.

Summary

The optical theory of the Maddox rod as used in clinical heterophoria testing is discussed in terms of the conoid of Sturm. The focal line of Sturm seen by the patient is a virtual image, always situated at the light source, and at right angles to the axis of the Maddox rod. The other focal line of the conoid of Sturm is a real image located several mm. from the Maddox cylinder, parallel to the cylinder axis, and cannot be seen by the patient because it is too close to his eye. The existence of the two focal lines may be proven by photography, direct observation, and projection upon a screen.

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THE BULLOUS DERMATOSES

A REVIEW AND CASE REPORT

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In 1866, von Hebra[2] separated erythema exudativum multiforme from an ill-defined group of erythemas. Kaposi[3] in 1893 reported the first form with mucous-membrane involvement. Sorsby[4] and Thygeson[5] have given emphasis to bullous dermatoses of the eyelids and at present, it is felt that the condition is either of an allergic, bacterial, or virus etiology.

In evaluating the various dermatoses associated with eye pathology it is most interesting to note the different patterns; for example, the virus diseases, such as variola, vaccinia, and varicella which are at times complicated by keratitis, conjunctivitis, uveitis, and even optic neuritis, are usually the result of direct infection of the eye.[1-6] On the other hand, in bullous dermatoses, such as erythema multiforme, pemphigus, dermatitis herpetiformis, or epidermolysis bullosa, where no direct infection is evident in the ocular tissues, there are such severe conjunctival and corneal complications that they sometimes terminate in essential shrinkage of the conjunctiva and marked corneal atrophy.

In contrast to the above-mentioned patterns of skin and eye pathology, in the atopic dermatoses and in scleroderma, associated cataract formation is frequently found. Again, in Boeck's sarcoid, uveitis is most commonly found; whereas, in Vogt-Koganagi's syndrome with leukodermia and alopecia, poliosis and deafness, there is bilateral granulomatous endophthalmitis.

Because of their similar morphology, chronic progression, and terminal effects, I shall emphasize the bullous dermatoses in this discussion. In Table 1, only those dermatologic characteristics most pertinent to the differential diagnosis of these diseases and the typical ocular changes which most frequently occur have been included.

CASE REPORT

History. A. H., aged seven years, a white girl, was treated on August 18, 1952, for one week by the family physician at her home. During this time she ran a high fever and apparently had multiple vesicular, papular, and bullous lesions of the body, extremities, eyelids and both eyes, and mucous membranes of the mouth. She was given two injections of penicillin, 400,000 units each, in a 24-hour period and the family was advised to have her hospitalized.

On August 24th, one week later, she was sent to the contagious disease department of the Harrisburg Hospital with an admitting diagnosis of chickenpox lesions of the lids and eyeballs. On September 17th, three weeks from time of onset, corneal adhesions were present. The following is an outline of her therapy regime before admission to Wills Eye Hospital on October 29, 1952:

1. 300,000 units of penicillin, twice daily.

2. Boric-acid irrigations and 10-percent argyrol, six times a day, was started on August 28th.

3. On September 2nd, approximately 14 days after onset of illness, she was started on the following topical therapy: atropine sulfate, three times daily; cortisone, 0.5 percent hourly; aureomycin, every two hours.

Family history. Her father, mother, two brothers, and one sister had had no serious illnesses in the past year, no unusual eye complaints, and no venereal diseases.

Past medical history. Normal birth, received all immunizations during childhood, has no known allergies, and was a healthy child up to time of this illness.

Examination at the Wills Eye Hospital on October 9, 1952, revealed:

Systemic examination:

The skin of the face, chest, and extremities showed slightly pigmented, depressed, and atrophic scars varying in size from 3.0 to 10 mm. A moderate degree of rhinitis and atrophic scars from lesions of the buccal mucosa were present. There was increase in

TABLE 1

DERMATOLOGIC CONSIDERATIONS AND OCULAR CHANGES OCCURRING MOST FREQUENTLY IN THE BULLOUS DERMATOSES

Disease	Etiology	Skin Manifestations	Site of Lesions	Blood Changes	Ocular Sequellae
I. *a.* Chronic pemphigus with ocular involvement and *b.* Ocular pemphigus *per se*	Not proven; suspect: (1) virus, (2) drug allergy	Vesicles and bullae (serous, hemorrhagic or suppurative) Arise from normal skin with a generalized eruption	Pluriorificial: (1) lips, (2) mouth, (3) rectum, (4) vagina	+ Eosinophilia Low grade conjunctival eosinophilia	Destructive ocular cicatrization Contractures Essential shrinkage of conjunctiva
II. Erythema multiforme bullosum (Stevens-Johnson syndrome) Erythema multiforme malignans with ocular involvement	Not proven; suspect: (1) drug allergy, (2) virus, (3) streptococci infection	Polymorphism, macules, papules, and bullae Arise from abnormal skin Symmetrical groups	Pluriorificial frequently	Eosinophilia conjunctiva	Conjunctival shrinkage with destructive changes
III. Dermatitis herpetiformis	1. Drug allergy 2. Virus	Polymorphism + 10% Intense paresthesias (mainly lower extremities)	Pluriorificial in less than 10%	High eosinophilia Conjunctival eosinophilia	Conjunctival shrinkage with destructive changes
IV. Epidermolysis bullosa	1. Congenital 2. Frequently hereditary	Flaccid bullae (serous or hemorrhagic) Dystrophic skin and nails	Pluriorificial rarely	No eosinophila	Infrequent ocular changes

bronchial breath sounds at both bases posteriorly; no rales heard; no evidence of tactile fremitus. X-ray films showed a slight increase in vascular markings. The rectum was free of any mucous-membrane involvement. The vagina was negative.

Ocular examination. There was a moderate degree of palpebral and ocular conjunctivitis in both eyes; generalized symblepharon and marked ankyloblepharon in both eyes. Due to marked shrinkage and folds in the cul-de-sac, the corneas were seen incompletely and

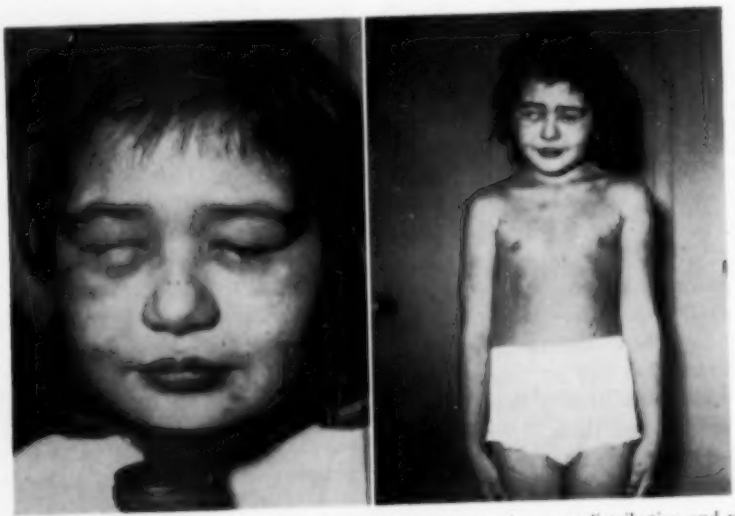

Fig. 1 (Kratka). Appearance of patient's face and body, showing frequent distribution and pleomorphic characteristics of the scars. Note the unusual closed palpebral fissure which is due to symblepharon and marked photophobia.

with difficulty and with pain to the patient. Both corneas showed marked over-all scarring and drying except in two small areas which had not been completely vascularized. This was confirmed by Dr. Spaeth under general anesthesia. Dr. Spaeth also felt that the facets of remaining cornea on each eye were beyond surgical assistance. He believed the tactile tension to be markedly elevated in the right eye and soft in the perforated left eye.

Laboratory studies. Smear and culture on October 20th showed gram-positive Staphylococcus albus hemolyticus and many pus cells. Blood count: Hemoglobin, 80 percent; white blood cells, 8,450; Kahn and Wassermann tests negative.

Conjunctival scrapings on November 10th showed rare eosinophils. White blood cells, 16,850, with poly-morphonuclears, 59 percent; lymphocytes, 37 percent; low-grade eosinophilia, four percent. Blood sugar: 75 mg./cc. Shirmer tearing test, no secretion either eye. Sedimentation rate, November 12th, was 15 mm. per 60 minutes. White blood cells, November 14th, 10,400, with polymorphonuclears, 59 percent; lymphocytes, 37 percent; eosinophils, four percent.

On November 20th, smear and culture showed Staphylococcus aureus. On November 22nd, there were 15 eosinophils per cc. The temperature curve except for the first few days was normal.

Treatment. At Wills Eye Hospital, this patient received the following topical and parenteral medication: Atropine (0.5 percent, twice daily), cortisone (1:4 dilution, 0.5 percent, in 1:10,000 Zephiran, as drops every two hours), chloramphenicol drops (2.5 mg./cc. every three hours during the day), terramycin ointment (5.0 mg./gm. at bedtime), parenteral cortisone (maintained on 50 mg. per day), and parenteral penicillin (300,000 units per day). Because of an irritating trichiasis of the right upper lid, secondary to entropion, a conformer was inserted on November 6th.

Consultation. In view of the patient's age, it was generally agreed that she was suffering from Stevens-Johnson disease rather than ocular pemphigus. The consulting dermatologist, Dr. Gross, diagnosed the condition as erythema multiforme bullosum. This diagnosis was confirmed by Dr. Klauder.

Dr. Ritter, who has reported[7] a number of cases of erythema multiforme with pluriorificial lesions, made the following comments on November 24th: "This child has pigmentary residue of erythema multiforme and the eye sequelae of the same condition which generally is called erythema multiforme with pluriorificial lesions. Pemphigus is extremely rare in this age group and I, personally, have never seen or read of its occurrence in children."

Discussion

In reviewing the essential features of erythema multiforme exudativum, Cowan and Klauder[8] in their discussion and report on 11 cases classified the condition into three groups:

1. Acute infectious diseases of infants and children—febrile bullosa, toxic erythema, and erythema multiforme (Stevens-Johnson disease).

2. True pemphigus primarily an adult disease with involvement of the eye and mucous membranes of the orifices and the skin.

3. A conjunctival involvement simulating pemphigus, ectodermosis erosiva pluriorificialis; postvaccinial bullous eruption in children; erythroderma; dermatitis herpetiformis; epidermolysis bullosa.

At the present time, the accepted therapeutic regime includes:

1. Prevention of secondary bacterial infections, both ocular and systemic, by the use of broad-spectrum antibiotics (chloramphenicol, terramycin, aureomycin[9]). The sulfonamides are recommended in dermatitis herpetiformis[10]

2. ACTH. Cortisone, topically and systemically[11]

3. Autohemotherapy and transfusions,[12] supportive and high-vitamin therapy

4. Immune serum
5. Vaccines
6. Local X-ray therapy
7. Artificial tears and iced compresses
8. Application of Fowler's solution
9. Scar separation and transplantation of normal mucous membrane (rarely successful)
10. Electrolysis for trichiasis
11. Cauterization of the canaliculi

Conclusions

1. A careful clinical history should be taken in order to prove or disprove drug allergies or a virus etiology.

2. The age of the patient and the results of laboratory studies (increased eosinophils in the blood or in the conjunctival scrapings) are important diagnostic factors.

3. In view of their frequent termination in essential shrinkage of the conjunctiva, kerato-conjunctivitis sicca, and a thin, parchmentlike cornea that may perforate and rupture, the bullous dermatoses are serious affections and should be treated as such.

4. The necessity of early recognition should be emphasized for therapy in the late destructive stages is hopeless. Early antibiotic and cortisone therapy, systemic and topical, is the treatment of choice at this time.

Medical Arts Building.

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CONGENITAL SYMBLEPHARON

M. Wallace Friedman, M. D.
San Francisco, California

A symblepharon is a cicatricial adhesion between the palpebral conjunctiva and the bulbar conjunctiva or the cornea. Injuries, burns, caustics, and such destructive conjunctival diseases as membranous or purulent conjunctivitis, pemphigus, or vaccinal blepharitis are the etiologic factors generally blamed.

Cryptophthalmos is a condition of total ablepharon wherein there is a complete failure of the lid folds.[1] Nowhere in the literature was it possible to find a report of a congenital symblepharon somewhere between a small adhesion and complete cryptophthalmos. Mann[2] states that symblepharon is usually inflammatory and very rarely congenital.

The following is a brief report of a case of congenital symblepharon.

Case report

J. F. K., a white single 19-year-old sailor,

Fig. 1 (Friedman). Congenital symblepharon of the left eye. A band of conjunctiva stretches from the temporal limbus at the 5-o'clock position temporally to insert in a broad band in the lower lid. A tunnel was formed through which a probe could be passed with ease.

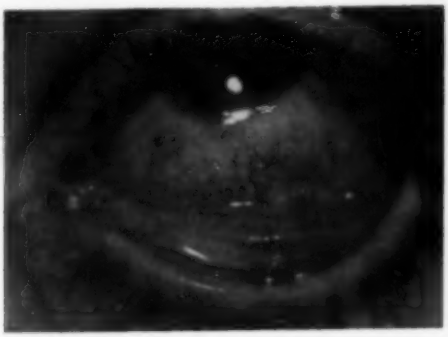

Fig. 2 (Friedman). Postoperative appearance of left eye.

reported to me because of a "scar" in his left eye which had been present as long as he could remember. On looking to the extreme right the patient experienced diplopia. This was his only complaint. His history failed to reveal any type of trauma, inflammatory process, or destructive lesion. Careful questioning of the parents also failed to reveal any clue as to the etiology of the "scar."

Examination was completely negative except for the presence of a symblepharon, eight mm. wide and 12 mm. long, between the bulbar and palpebral conjunctiva. The band ran from the perilimbal area down and temporally to attach in a wide insertion on the lower left lid (fig. 1). Under the slit-lamp the adjacent conjunctiva seemed white and atrophic. There was a tunnel underneath the band through which a large probe could be passed with ease.

Operation. The patient was admitted to the hospital and, under local anesthesia, the band was excised. Twisted silk sutures (6-0) were used to close the defect after mobilization of the surrounding conjunctiva. A plastic stent was inserted to prevent re-adhesion of the raw surfaces and a pressure dressing was applied.

The pathology report on the removed tissue stated that the microscopic picture resembled that of a pterygium. Unfortunately, the patient was transferred six weeks after surgery but at that time there had been good healing without recurrence or diplopia (fig. 2).

490 Post Street (2).

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CORNEOSCLERAL SUTURING FORCEPS

JOHN J. SAUER, M.D.
New York

There is a need in corneoscleral suturing for a forceps which is small, strong, and produces a minimum of trauma while the needle is being inserted. Required are small, strong teeth set at an oblique angle on a shaft which is limited by a stop to prevent excessive overlapping of teeth and thereby prevent an unnecessary amount of tissue trauma.

Among the different types of forceps now in use (Bracken, Elschnig, Gifford, Kirby, and O'Brien), it was found that the teeth

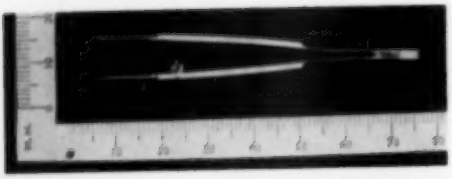

Fig. 1 (Sauer). Corneoscleral suturing forceps.

were too long and large and the entire forceps too bulky.

The forceps which I have devised (fig. 1) are 70-mm. long. The tip is 13-mm. long and 1.0-mm. wide and the corrugated handle, 6.0-mm. wide. The 1:2 teeth are very strong not over 0.6 mm. long, form a 45-degree angle, and overlap slightly.

The stop is 19 mm. from the teeth.

These forceps have been found useful in firmly fixing the cornea or sclera and in grasping the lips in corneoscleral suturing; in fixing the scleral edge in sclerectomy; in border-to-border corneoscleral suturing as advocated by Dunnington; and may be used in fixing a child's globe. The forceps will not hold conjunctiva, the latter sliding free between the teeth. The stop limits the bite of the teeth into the tissue, and thus prevents excessive trauma, while still giving a firm hold and facilitating the insertion of the needle.

30 East 40th Street (16).

HALF GLASSES FOR APHAKIA

WALTER S. ATKINSON, M.D.
Watertown, New York

The half glasses (fig. 1) are used for the aphakic eye during convalescence following cataract extraction or other operations on the fellow eye. It is held in place with a small strip of scotch tape over the bridge and temple.

The improved vision obtained in this manner is greatly appreciated by the patients and makes the days following cataract extraction more pleasant.

It was devised by Mr. Robert VanBenscoten, dispensing optician, Watertown, New York.

Fig. 1 (Atkinson). Half glasses for aphakia.

129 Clinton Street.

SOCIETY PROCEEDINGS

Edited by Donald J. Lyle, M.D.

CHICAGO OPHTHALMOLOGICAL SOCIETY

November 16, 1953

Dr. Gail R. Soper, *President*

The Clinical Meeting was presented by the Departments of Ophthalmology of Chicago Medical School and Michael Reese Hospital

Disciform degeneration of macula

Dr. Gilbert Iser presented B. M., a 73-year-old white man first seen at Mandel Clinic in May, 1949, with the complaint of epiphora.

Examination revealed visual acuity of: O.D., 20/100, correctible to 20/30; O.S., 20/40, correctible to 20/40. Tension was 17/20 mm. Hg (Schiøtz). External examination was normal. The discs were flat with slight temporal conus; the maculas were normal. Treatment consisted of probing and irrigation of the lacrimal ducts. An euphthalmine refraction corrected vision to 20/20.

He was seen several times during ensuing months with minor complaints. Eleven months later, he complained of poor vision in the right eye for one month. Corrected vision in this eye was 20/60. There was no pain or evidence of external inflammation.

On fundus examination there was seen immediately nasalward to the fovea a circular, fairly discrete, questionably elevated lesion, dirty gray in color, the periphery being more heavily pigmented. It was approximately one disc diameter in size. The overlying retina was hazy.

Two weeks later the binocular ophthalmoscope revealed the lesion to be sharply limited and situated in the choroid, not elevated, with the overlying retina intact. There was a lighter halo about the lesion suggesting disturbance of the pigment epithelium. Temporal to the halo was an ill-defined light reddish area which was possibly deep hemorrhage.

Five months later there was some superficial hemorrhage visible on the surface of the lesion; pigmentation was more pronounced and there were some radiating white lines about the area. After an additional five months, numerous flame-shaped hemorrhages were seen above the lesion; the picture was otherwise unchanged. Vision in the right eye had deteriorated to finger counting at three feet with correction.

Although there was a question of this being a tumor when it was first seen, the lack of increase in size and the development of a rather typical picture is evidence of its being a disciform degeneration of the macula lutea.

Neurinoma of orbit

Dr. Burton Krimmer presented L. K., a 26-year-old white woman, first seen in the eye clinic of Michael Reese Hospital on November 28, 1950, because of proptosis, impaired ocular motility, and visual loss of the left eye of several months' duration. There was no history of trauma, but a dull headache persisted above the left eye.

Vision was: R.E., 20/15; L.E., 20/40. The left eye was proptosed. There was an impairment of the field of action of the left internal rectus, left inferior, and superior oblique muscles. The globe could not be compressed into the orbit. The left disc borders were poorly defined and the veins mildly dilated. Tension was soft. The left central field revealed a slightly enlarged blindspot.

Because a retrobulbar tumor was suspected the patient was hospitalized for study. No significant findings were revealed by laboratory tests including X-ray and arteriographic studies. Exploration of the orbit on

December 29, 1950, via cranial approach, disclosed a pinkish-tan granular mass within the muscle cone adherent to the bulb nasally and above. The tumor was difficult to extract and had to be removed piecemeal, some being left in the orbit. No extension through the optic foramen was visible.

The postoperative course was uneventful except for moderate edema about the lids and some diplopia in the lower fields. Nine months later the visual acuity was 20/20 in each eye. Diplopia was no longer a complaint. The left fundus was clear with some traction striae above the macula.

Microscopically the tumor was quite cellular, consisting of a solid mass of interlacing bundles and whorls of spindle-shaped cells with regular, elongated, oval, pale-staining nuclei. There was a tendency toward palisade arrangement, characteristic of the Antoni type-A neurinoma in contradistinction to the Antoni type-B with loose areolar tissue and microcysts. Verocay bodies, cells, and fibers which arrange themselves into units resembling tactile corpuscles were not visible in the tumor mass.

The neurinoma is believed to originate from the Schwann cells. It can occur anywhere along the course of a peripheral, cranial, or sympathetic nerve. Although it is difficult to determine, the tumor in this case may have originated from the ciliary nerves. The eye manifestations of this tumor have no distinct clinical features, and have been reported in every age group.

Discussion. Dr. Daniel Snydacker: In orbital tumors of this type, the ophthalmologist making the diagnosis is prone to turn the case over to the neurosurgeon and assume that he will make a transfrontal approach, elevate the roof of the orbit and remove the tumor, whereupon everybody will live happily ever after. Such unfortunately is not always the case. Unroofing the orbit is a major procedure, but might well be justifiable if the results were satisfactory. As in this case, however, removal of the entire tumor even with the orbit unroofed is sometimes exceedingly difficult.

One case is recalled in which the orbit was unroofed, an attempt was made to extirpate the tumor, the attempt was unsuccessful and the incision was closed. The tumor started to grow again and a second attempt was made to remove it. At this time the neurosurgeon encountered such a confused mass of scar tissue that nothing could be done. If these cases are turned over to a neurosurgeon, an ophthalmologist should scrub with him. Even though the orbit is unroofed and an excellent approach is obtained, total extirpation of the tumor is often very difficult.

Dr. Paul Sternberg: I concur with Dr. Snydacker. Although the neurosurgeon made a transfrontal approach in this case, the entire tumor was not removed and it continued to grow. In spite of X-ray therapy the tumor has continued to grow and the exophthalmos has increased. The latest report from the neurosurgical department is that, at this time, the tumor is inoperable. It may seem a paradox that the pathologic picture is that of a benign neurinoma.

Late infantile amaurotic idiocy

Dr. Bertha A. Klien presented a clinicohistopathologic study of the case of a boy, aged five years, in which the ocular findings of the juvenile form of amaurotic idiocy with diffuse pigmentary degeneration were combined at an unusually early age with a symptom complex characteristic of the infantile form. This paper is published in full in The Journal (38:470-475 [Oct.] 1954).

Acute ophthalmoplegia

Dr. Ira A. Abrahamson, Jr., and Dr. Irving D. Horwitz discussed acute ophthalmoplegia and emphasized the infranuclear conditions, capable of producing an acute onset of internal and external ophthalmoplegia, which the practicing ophthalmologist most frequently considers in the differential diagnosis of this serious affec-

tion: (1) Aneurysm of internal carotid artery or circle of Willis; (2) trauma (orbital fracture or orbital hematoma); (3) orbital cellulitis secondary to acute paranasal sinusitis; (4) ophthalmoplegic migraine; (5) myasthenia gravis. This paper is published in full in THE JOURNAL (**38**: 781-787 [Dec.] 1954).

Discussion. DR. OSCAR SUGAR: I feel that it is important for ophthalmologists to recognize this condition so that they may treat it or see that treatment is given. One never knows when rupture of a cerebral aneurysm will occur. A patient who has had bleeding from such a lesion will have a 50-50 chance of dying in the first three weeks and, if he survives the first three months, he has a 50-50 chance of dying within the next year. The threat of death hangs over the head of anyone who has bleeding into the subarachnoid space.

Aneurysms that occur on the internal carotid artery just above the clinoid process are by far the most common. (Slide) This is such an aneurysm occurring in an older person. It adheres to the oculomotor nerve. The oculomotor nerve leaves the cavernous sinus and runs free much of the time under the temporal lobe before it reaches the superior orbital fissure, so it is in just the right place for a bulge on the internal carotid artery to reach out and grasp it, so to speak, and adhere to it; dissecting the aneurysm off the nerve is difficult.

(Slide) This is an aneurysm of the internal carotid artery in the cavernous sinus below the anterior clinoid, under the dura mater and in a place where it is not surgically accessible. It completely fills the cavernous sinus and causes third, fourth, and sixth-nerve palsy and hypesthesia of the forehead from interference with the ophthalmic branch of the trigeminal nerve. This was the case of a woman aged 60 years, who had a sudden onset of total external and internal ophthalmoplegia, with headache. An arteriogram was done and at operation it was found that she could not tolerate occlusion of the internal carotid artery for more than two minutes before she became hemiplegic; therefore the carotid artery was tied only half way. She is well except for some residual third-nerve paralysis; the sixth and fourth nerves apparently have come back.

(Slide) In the anteroposterior angiogram one can see a thin vessel, an anomalous artery which is not normally present. In this patient it had no relationship to the temporal lobe, passed across the bottom of the temporal fossa and disappeared at the side. On its way it "stepped on" the third nerve and caused third-nerve palsy. A silver clip was applied at two points and the artery was severed between the clips so that it no longer compressed the nerve; the patient is alive and well and no longer has third-nerve palsy.

(Slide) Sometimes trauma to the orbit does not cause a large hematoma, does not fracture the orbital bones, or compress the third, fourth, or sixth nerves but may involve the cavernous sinus. In this Negro boy the space above the eyelid is swollen and the dilated vein is visible. This boy ran a knife under the lower lid into the eye and some weeks later a pulsating exophthalmos appeared.

(Slide) Dye was injected into the carotid artery and, where the artery goes through the cavernous sinus, the dye also went into the cavernous sinus through the orbit, over the surface of the forehead, and down the wrong way through the scalp veins. Here you see a traumatic arteriovenous fistula from a knife blade producing pulsating exophthalmos and third, fourth, and sixth nerve palsy. In small children one need not worry about the blood supply to the brain.

(Slide) This is a vertebral arteriogram of the same child. The needle is inserted into the vertebral artery; dye goes up the basilar artery, communicates across to the internal carotid circulation to supply the whole side of the cerebral hemisphere and the anterior cerebral artery.

The posterior cerebral artery is another

place where aneurysms may occur and compress the third nerve. Also they may occur at the bifurcation of the basilar artery, where both third nerves leave the middle of the cerebral peduncle; this causes bilateral oculomotor palsy.

Lastly, there may be aneurysms of the superior cerebellar artery where the third nerve passes between the superior and the posterior cerebellar arteries, and it is here, perhaps, that the oculomotor nerve is interfered with in cases in which there is ophthalmoplegic migraine. Such patients are shown at autopsy to have no aneurysm, nor are aneurysms found during life when searched for with arteriograms.

If it is true that the basis of migraine is some sort of vasospasm of the posterior cerebral artery, and if one hypothecates that when an artery goes into spasm it changes position, one can imagine that when this happens to the posterior cerebral artery the third nerve, which passes between the superior cerebellar and the posterior cerebral arteries at the base of the brain, could be caught while the artery is in spasm, and result in at least temporary and later perhaps permanent malfunction of the third nerve.

It is not innocuous to inject Diodrast into an artery. It is an irritating substance; it makes the brain swell, it causes capillary damage, and it causes vasoconstriction. However, as pointed out by the authors, one must select cases and one must select the angiographer.

Angiography can be done readily by inserting a needle into the neck; the carotid artery is almost always there. Sometimes it does not carry blood if there is a syndrome of thrombosis of the internal carotid artery, but usually there is no difficulty if it can be felt to pulsate. With the modern cameras, one or two injections of Diodrast can be innocuous in most patients. Dr. Ver Bruggen has a large series of angiograms in patients up to the age of 80 years and has had no complications.

Hypertension is not a contraindication; only arteriosclerosis and the fear of the operator should contradict doing one. However, if one injects 100 cc. of Diodrast, the patient may not awaken, but one should not hesitate to recommend it in a case of third-nerve palsy with no obvious trauma or infection. One should not deny the patient that chance for treatment.

Treatment is not always innocuous. The internal carotid may be the only source of blood supply to that side of the hemisphere. On the other hand, the mortality rate for untreated aneurysms is so high that serious consideration should be given before advising bedrest only.

Dr. Julia Apter: It would seem logical that, if an aneurysm has been present for a long time, it must undergo some sudden change in itself to cause symptoms to appear suddenly. These changes might be reversible. Does the aneurysm bleed a little; does it suddenly increase in size? That might be important not only because it augurs well for patients in whom treatment is contraindicated but also because it might help evaluate the treatment that is given.

Dr. Joseph Haas: I wonder if there is any valid reason or explanation for the fact that most of these cases occurred upon arising; that would seem a most unlikely time.

Dr. Gail R. Soper: In recent years we have seen quite a number of so-called congenital aneurysms or traumatic aneurysms in this region. Recently a woman was seen at Evanston Hospital who had progressive loss of vision since last spring and optic atrophy with quite a definite type of homonymous hemianopsia. This was demonstrated by angiography to be due to an aneurysm. Such aneurysms can cause other symptoms besides those mentioned.

Dr. Oscar Sugar: If one examines at autopsy the wall of an aneurysm which had been compressing the third nerve, one may see small hemorrhages into the wall of the aneurysm, and places where the aneurysm has lost its muscle wall and become paper-shell thin. In these small congenital aneurysms

which represent weak spots in the wall of a blood vessel and have little media and little or no muscle, the pressure which piles up day after day gradually causes weakness which ultimately—not always in the morning, unfortunately—causes them to blow out, just as a weak spot in a tire tube will suddenly blow out. However, that is not always the case.

Some aneurysms expand gradually and cause partial third-nerve palsy which later becomes more complete. There may be preliminary warning, partial third-nerve palsy that lasts three or four days and then disappears. This is because there is thrombosis in the wall inside the aneurysm, and many patients get along well without anything being done. A clot actually forms; one can demonstrate laminated clots at autopsy in patients who have had such recurrent episodes. The difficulty is in determining which aneurysm is going to clot and which is not.

Richard C. Gamble,
Recording Secretary

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

October 5, 1953

Dr. Bernard Fread, *President*

Dr. Henry Minsky presented, with lantern slides, a paper on "Early retinal changes in essential hypertension correlated with the diastolic blood pressure" and stressed the following points:

1. In general, arteriosclerosis tends to broaden the appearance of an arteriole, while hypertension narrows it.

2. Uniform narrowing of the segments of the arteriole has a quantitative as well as a qualitative significance.

3. Focal "constrictions," better termed "narrowings," are similarly significant.

4. Focal narrowings (such as a distal tapering, proximal tapering, "hour-glass" narrowing, beading, narrowed forks, or branchings) deserve special terms. The easy recognition of these focal narrowings serves to alert the observer to vascular signs pathognomonic of essential hypertension and permits him to look again for the uniform narrowing which he might have missed in the first scanning of the fundus vessels.

5. Narrowing is the obvious departure from the normal relationship of the diameter of stem to the immediate branch (10:8 or 10:7).

6. The retinal vein may also be narrowed.

7. One hundred cases were studied and the signs associated with the nerveheads (vascular changes, retinopathy, arteriovenous crossing disease) were each assigned numerical values, termed *weighted* signs.

8. The weighted signs gave an indication of the severity of a patient's hypertension and, when added to the lower level of beginning hypertension, the sum of these signs gave a total which corresponded to the level of a diastolic pressure that the patient had suffered for a considerable stretch of time in his history, recent or remote.

9. However, when either edema or elevation of the nervehead was present, it was found necessary to double the numerical values assigned to the groups of uniform narrowing in order to bring the theoretical, estimated diastolic pressure level up to that actually found in the patient's history.

10. The coefficient of correlation calculated statistically from the raw data was 0.87.

11. For purposes of simplicity of presentation, no reference was made in this talk to the previously reported equation for estimating the diastolic pressure.

12. In closing, a fundus photograph of a particular patient was presented to illustrate the method of assigning the weighted values to the hypertensive signs and of thus estimating the diastolic pressure.

After the address by Dr. Henry Minsky, the following questions were asked from the floor:

1. Dr. A. Kornzweig: I would like to ask Dr. Minsky how he arrived at the

weighted signs or numbers?

2. Dr. W. Rose: It is exceedingly interesting and very significant that any calculated diastolic blood pressure could be more accurate than the clinical sphygmomanometer reading. I was greatly impressed with this as I had the pleasure of seeing Dr. Minsky's exhibit at the A.M.A. meeting, so I am a little more familiar with it than some. I would like to have a little more information on the valuation of an estimate for hemorrhage, which I believe was given as 3. Hemorrhage is obviously a relative thing, it can be small or large, and I would like to know how the value was arrived at?

3. Dr. S. Kleefeld: Were measurements made by direct examination of the fundus or by photograph?

4. Dr. S. Gartner: The retinal picture in hypertension varies a great deal because of incipient arteriosclerosis. We have many cases in which arteriosclerosis precedes the hypertension and the picture is magnified. Did Dr. Minsky find any difference in his calculations in different ages? Did he find the same in a young man as in an older individual? The other thing that interested me is the correlation of eye size A1 to A2, 10 to 7. If you will square those numbers, 7 square equals the square of the main branch, you would expect two branches with a diameter of about 7 to carry the same amount of blood as the main branch with a diameter of 10.

5. Dr. Levitt: I am curious, did anyone else ever try to do anything similar?

6. Dr. H. Agatston: Did Dr. Minsky take into consideration certain other factors? Diastolic pressure can vary quite a bit in certain individuals—in some conditions it is 86 or 90 mm. Hg, in other conditions 100 mm. Hg or even more. We know that it has something to do with pulse, and blood volume, as well, and that can vary. I would also like to ask about the venous crossing sign. In some the venous crossing sign is quite marked. How does Dr. Minsky feel about the crossing sign in evaluating blood pressure?

Dr. Minsky replied:

In answer to Dr. Kornzweig's question about the method of arriving at the numbers in the weighted signs, there were four steps:

1. I first established a base line of the lower limits of hypertension from Arthur Master's statistics which he had collected according to age and sex.

2. Translation of pressures to percentage deviation was done from this base line. Twelve of my 100 cases were nonhypertensives, and they each assumed a minus percentage deviation from the high normal limits. The rest, hypertensives, were considered each to be a plus deviation from the lower limits of hypertension.

3. For each sign, the average of the various deviations was calculated. This step was also made for the combination of signs as well as for single signs. From plotting of the frequency distribution of not only single signs but also of related groups of signs, I could determine how important any one sign was in my series of cases.

4. These averages were then reduced to small, round numbers and then arranged in columns of related clinical importance. The numbers were then further changed slightly so as to express progressively increasing values according to my impression of the degree of clinical severity.

As to the evaluation of the signs of retinal hemorrhage asked by Dr. Rose, I thought the important consideration was that, by the time a retinal hemorrhage did occur, such pathologic changes had previously developed to permit its appearance, the number and/or extent of hemorrhage added no greater weight to the sign. Hence, only one value was assigned to hemorrhage, regardless of extent or number.

To Dr. Kleefeld's question, I must reply that the only measurement I made was that of the relationship of diameter of the stem to its immediate branches in the normal vessels.

To Dr. Gartner's question of the impact of age:

In my preliminary deliberations, I assumed that the same fundus picture in a younger person was indicative of a higher diastolic level than when it appeared in an older one. In fact, I drew a curve from the data which showed an inverse relationship of pressure levels to age in the cases of patients between 30 and 60 years of age where the majority of the cases occurred. I then assumed the direction of the remainder of the curve to be zero increase at 70 years of age; on the other hand, at 10 years of age the weighted signs were to be doubled in value. When Dr. Feitelberg made the statistical calculations, however, he advised deferring consideration of the age factor since he was convinced of the validity of my premise because he was able to find a very high coefficient of correlation (0.87) and, finally, an equation which expressed the relationship between the sum of the weighted signs and the actual diastolic pressures in this study.

Dr. Gartner's other question about the theoretical calculation of the diameter of stem and branches had such imponderable factors as rate of flow, blood volume, viscosity, and so forth, that it was judged easier just to measure the vessels.

In reply to Dr. Levitt's question, I can only reply that, although many observers have thought about the problem, no one has, heretofore, presented a numerical system.

In reply to Dr. Agatston. His calling attention to the fluctuation of diastolic pressure in the same patient gives me the opportunity of acknowledging the great debt we owe to Dr. Sigmund Agatston, his father, who was the first, as far as I know, to claim the ability to judge a patient's diastolic pressure from the hypertensive changes in the fundus. In a sense, this presentation is the result of his insistence for years upon the correlation of signs and blood pressure, in the face of the doubt and skepticisms of his contemporaries.

When I use the term "diastolic pressure," I refer to that diastolic pressure in the history of the particular patient which has been maintained for a considerable stretch of time in the remote or recent past. So true is this premise that I believe that a marked difference betwen the diastolic pressure level as estimated from the fundus and the actual pressure read by the sphygmomanometer has clinical import.

If the estimated diastolic pressure is higher, the patient is suffering from coronary disease or myocardial dysfunction; if it is lower, we should consider his hypertension as being psychogenic. Of course, the venous crossing sign contributes to the evaluation depending on which segment or segments of the arteriole produce the arteriovenous crossing sign and on the presence of displacement. Concealment by itself occurred too infrequently in this series to be evaluated. For example, when all the first four arteriolar segments produced positive venous crossing signs, 12 units were assigned to the combination.

Bernard Kronenberg,
Recording Secretary.

YALE UNIVERSITY CLINICAL CONFERENCES

November 13, 1953

DR. R. M. FASANELLA, *presiding*

PRESENT STATUS OF CLINICAL ELECTRORETINOGRAPHY

DR. J. MILES O'BRIEN discussed the history of electroretinography, describing the original work of Dewar and McKendrick who recorded changes in the electrical potential of the human eye when exposed to light. The further developments of Kolna and Lowenstein, Hartline, Cooper, Creed and Granit, Karpe, and Riggs were noted. The present apparatus used (Karpe) has a condenser-coupled amplifier with an oscillograph recording via a photoelectric cell on film. A modified contact lens is used as the lead-off.

The anatomic and physiologic complexity of the retina led Cajal to call it "a true nervous center," and the study of retinal potentials gives an insight into the physiologic

action of the central nervous system.

The main features of the vertebrate electroretinogram are as follows:

The small negative a-wave, a large positive b-wave, a slow positive c-wave, and the "off effect" or d-wave. Mammals possess an e-type electroretinogram, and amphibia, fish, reptiles, and birds an i-type. The e-type retina is noted to be rod-dominant; the i-type cone dominant. It is not known exactly where the electroretinogram originates. Granit believes it originates in the bipolar cells and expresses activity of the synoptic layers of the retina.

Following exposure of the retina to a light flash there is a short latent period (1/20 sec.) following which the electroretinogram tracing is seen. The height of the b-wave varies from 0.3 to 0.6 mv. With a prolonged or very strong light stimulus there is a second rise of positivity called the c-wave, and when the light stimulus is discontinued, the "off effect" or d-wave appears. Clinically, we are concerned with the b-wave since it is this portion of the curve which shows variation with retinal disease and altered retinal physiology.

The details of technique were described and precautions regarding dark adaptation, relaxation, and so forth noted. In a series of 250 patients there were 90 percent successful recordings.

In general, five types of electroretinograms have been described by Karpe, depending on the activity and height of the b-wave; normal, subnormal, negative, extinguished, and supernormal.

Clinical applications in several conditions were discussed.

1. *Cataracts.* Unless cataracts are very dense, they do not alter the electroretinogram. If very dense, a slightly diminished b-wave will be recorded, which after surgery may return to normal. The usual senile cataract will give a normal reading providing there is good retinal response behind. However, with marked vitreous hemorrhage or recent uveitis with uncertain or poor light projection, the b-wave will be low or even subnormal. With large retinal lesions such as a thrombosis or detachment, the results of the electroretinogram will be of definite value. It should be noted that small separate lesions even involving the macula will not alter the electroretinogram.

2. *Circulatory disturbances.* Any major alteration in retinal circulation affects the electroretinogram. In early central vein thrombosis there is often an increased b-wave, also found in acute glaucoma. With complete venous obstruction, there is a negative electroretinogram, which, later on healing, may return to subnormal type. This may have prognostic value. Central artery involvement causes a negative electroretinogram even in early stages of the disease. Diabetic retinal involvement, unless very extensive, has shown no changes in the electroretinogram.

3. *Siderosis.* With an intraocular metallic foreign body at an early stage, the electroretinogram is supernormal but later becomes completely extinguished. This is true briefly of iron and steel fragments and the electroretinogram may be of help in deciding to risk extensive surgical manipulation or remove the eye.

4. *Detachment.* Initially it will give a subnormal or negative electroretinogram. The more extensive the detachment and the longer it exists, the lower will be the b-wave. In early small detachments, the tracing is usually subnormal and while it is not usually hard to see the detachment, in some cases the fundus may not be visible. A normal electroretinogram will rule out a detachment in these instances. Also of interest is the prognostic value of the tracing. If the b-wave is quite low or extinguished, the surgical results will nearly always be poor. However, if the b-wave is slightly subnormal, this indicates a rather good prognosis. Of interest is the fact that in unilateral detachments, the electroretinogram reflects the health of the entire retina as a factor in the cause of detachment.

5. *Retinitis pigmentosa, primary or hereditary type.* In 24 patients, ages six to 68 years, all tracings were extinguished. In some cases visual acuity and fields were normal and there was no retinal pigmentation. Others had almost no vision and tubular fields. Regardless of the stage of the disease, the tracings were all extinguished. It is now generally believed that the initial lesion of pigmentary degeneration is in the visual receptor cells, the disease beginning equatorially, and thus affecting the rods primarily. Involvement proceeds until the ganglion cells alone remain in the visual chain. It is assumed that the potentials producing the electroretinogram arises in the synoptic layers of the retina. Since rods are connected with other rods by these synopses, the absence of any tracing is significant. Just when this change in synoptic layers occurs is at present not known, but it could be seen in the earliest tracings in this series.

In summary, Dr. O'Brien said that these early studies of electroretinograms are highly valuable in attacking the problem of retinal physiology. The relation to electroencephalography has been shown in recent works by several authors.

December 11, 1953

Nongranulomatous uveitis

Dr. Good presented an interesting case of uveitis for discussion.

A 41-year-old white man had his first attack of iridocyclitis in the left eye in 1945. Etiologic workup was negative. In the next five years he had several such attacks, treated with mydriatics, and on occasion, beta radiation. In 1951, the intraocular pressure was elevated. Another series of investigations at the Massachusetts Eye and Ear Hospital were negative, including negative tuberculin test. Tension varied from 19 to 40 mm. Hg (Schiøtz).

A trephination was done in February, 1951, and postoperatively, he was carried on neosynephrine and cortisone. In August, 1951, tension again rose and there was a 3+ flare in the anterior chamber and there were numerous keratic precipitates. Slight field constriction was noted. An abscessed premolar tooth was found and was extracted, and this gave temporary improvement.

Recurrent attacks of iridocyclitis developed in September, 1951, and June, 1952, variously treated with ACTH and cortisone.

On the latter occasion, the left eye was found to become inflamed after exposure to powder and perfume and was controlled by antihistamines. Two attempts at desensitization to orris root caused flareups of the cyclitis. A third attempt with extremely small doses of orris root was begun and has been continued. The frequency of attacks of iridocyclitis was somewhat reduced but not completely eliminated.

Dr. Good considered this a case of nongranulomatous uveitis, and discussed the features of granulomatous and nongranulomatous uveitis.

Discussion. Dr. DeSuto-Nagy: I had a similar case of recurrent iridocyclitis, nongranulomatous. The worst occurred on Sundays, when the patient, working as an usher, was exposed to cosmetics. With reduction of exposure to powder, the attacks stopped. Later, a sudden attack of elevated intraocular pressure developed, and a trephining operation was done with good results. I considered this a typical case of allergy. Skin tests to other allergens are not conclusive for the eye. In doing a tuberculin test, one should look for focal eye reactions as well as a skin reaction.

Dr. Fasanella: How much beta radiation was used and where was it applied?

Dr. Good: Directly over the eye. I do not have the exact dosage.

Dr. L. Kaplan: In the use of tuberculin therapy, what are the indications for its use and how long do you use it?

Dr. Good: Indications, ocular tuberculosis; course recommended, one to three years. Practically, it is difficult to keep patients on treatment for that long.

Dr. L. Kaplan: I had a case with recurrent attacks of uveitis since 1947. Streptomycin was given for one week, with improvement on two occasions. For a recurrence in 1952, however, streptomycin proved ineffective. Tuberculin therapy was begun with dilutions of 1:1 million, increasing gradually. The uveitis became worse, with development of cataract.

Dr. E. Rosenthal: In real ocular tuberculosis, I have seen cases with a severe flareup of the tuberculosis when a local reaction was obtained. One must be extremely careful in using tuberculin or even doing a tuberculin test. I saw the loss of an eye on one occasion.

Low-tension glaucoma

Dr. Good presented the case of a 66-year-old white woman who was seen with bilateral cupping of the optic discs, grade II retinal arteriosclerosis, ocular tension in the right eye, 20 mm. Hg; left eye 22 mm. Hg (Schiøtz); deep anterior chamber, and bilateral nerve-fiber bundle field defects. Skull X-ray studies were negative. The ocular tension was never over 24 mm. Hg. One-percent pilocarpine was used, and slight increases in field defects were noted over a period of time.

Dr. Good discussed the theories of the so-called low-tension glaucoma: (1) Primary optic nerve atrophy; (2) defective lamina cribrosa; (3) intracranial pressure of internal carotids; (4) sclerotic nutrient vessels; (5) tumor in chiasmal area; (6) coloboma; (7) luetic atrophy. In treatment of these cases, glaucoma surgery is disappointing, and miotics are not too helpful.

Discussion. Dr. Wies: I saw a similar case a few years ago in which the fields were only slightly affected, with slight visual loss in the course of a few years.

Dr. A. Yudkin: There are few cases of cupping without increase of tension. I have seen not over six cases in all my practice.

Dr. W. Glass: Have any provocative tests or aqueous outflow studies been done? Dr. Becker has shown defective aqueous outflow facility in cases with normal tensions.

Dr. Good: Paredrine mydriasis was carried out and the tension dropped to 17 mm. Hg. A full diurnal tension curve was not done but, at different times of the day, tension was always normal. No water test was done because of the patient's age, and no outflow studies were done.

Dr. W. Glass: In a wide-angle case such as this, mydriasis tests would ordinarily be negative. The most useful provocative tests would be those which throw an added strain on the outflow apparatus, such as the Marx water-drinking test, aqueous-outflow facility test, and possibly the Lambert-Bloomfield lability test.

William I. Glass,
Recording Secretary.

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THE ADJUSTMENT TO APHAKIA*

It is a matter of common observation that patients with the best possible visual result from cataract extractions show a wide difference in their ability to adapt themselves to their aphakia. A few accept their correction with avidity, step boldly forth in their new world, and their happiness and elation over their restored vision dwarfs any unpleasant symptoms they may experience. A second group, probably a majority, have various difficulties in accepting their cor-

* This editorial, written, by request, by a physician who was successfully operated on for bilateral cataracts, first appeared as an editorial in THE JOURNAL three years ago (Am. J. Ophth., **35**:118-122 [Jan.] 1952). Since then hundreds of requests for reprints have exhausted the available supply. As a special service to readers of THE JOURNAL, "The adjustment to aphakia" is here published a second time. Orders for reprints will be accepted to July 1, 1955.

recting lenses and go through a period of readjustment before they finally become reconciled to their new visual status. A third group, fortunately few, are never able to wear their correcting lenses with any comfort or regularity and prefer to grope vaguely through a portion of their lives rather than accept the accurate, but to them startling, aphakic vision. What are the reasons for these varying reactions?

The ease with which an aphakic correction is accepted appears to vary in inverse proportion to the patient's visual needs.

Thus to a patient without the need for fine and accurate perception and who does not perform manual tasks requiring exact precision of movement, the acceptance of an aphakic correction imposes no great hardship. It is also notable that this group of easy acceptors rarely complains of visual loss when they return for a later refraction review, and it is found that with their first glasses their vision has fallen materially due to changes in their refraction.

The second group comprises individuals with more acute visual needs or whose vocation or profession requires manual tasks which can only be performed if accurate vision is present. To this group the peculiarities and limitations of aphakic vision present a real rehabilitation problem which must be met by intelligent efforts toward readjustment on the part of the patients themselves, with the sympathetic co-operation of the ophthalmologist.

In the third group, fortunately small, are usually neurotic or senile individuals who are appalled, overwhelmed, and disappointed by the peculiarities and sharpness of their new vision and who temperamentally are totally unable to adapt themselves to the changed external world. They wear their glasses only occasionally, usually for reading, and prefer to wander around in a mist rather than accept their new status.

From the viewpoint of the patient, what are the problems which face him when he first receives his aphakic correction? What is his readjustment problem?

When an aphakic patient first receives his correcting lenses and finally and expectantly tests his newly acquired vision in the security of his own home among familiar surroundings, he is immediately astounded by the remarkable manner in which his Lares and Penates have suddenly increased in size. If he is aphakic in one eye only and has still some fair residual vision in the second eye, the attempt at binocular vision produces a superimposed diplopia, the large image seen by the aphakic eye having a smaller reproduction as an inset. Useful binocular vision is impossible until the second eye is operated.

Even when the second eye is operated on successfully and tests on the Howard-Dolman apparatus show accurate depth perception, the size difference of familiar objects introduces a spatial element of false orientation. There ensues, therefore, an unpleasant period when tumblers are overturned, when, reaching for the salt, the unfortunate patient puts his fingers in the gravy-boat, flower vases are upset, ink is spilled, and other similar minor domestic tragedies occur, all exasperating to the patient and sorely trying to the members of his household.

It usually takes several weeks for the neophyte in aphakic vision to accustom himself to the magnified aspect of the outside world, forget his previous and now erroneous concepts of the size of objects, and so to overcome the false orientation. Parenthetically, there may be pleasant aspects to this size difference, as in the case of the gentleman who, in his phakic existence, has been surrounded by a group of short and somewhat rotund ladies, and in his aphakic status finds them transformed into Helens of Troy—daughters of the Gods, divinely tall and so divinely fair!

The second, and fortunately transient, unpleasant phenomenon encountered by the new aphakic is spherical aberration. At first it appears almost impossible to live in a world in which all straight lines are transformed into curves and a linear and upright world is suddenly converted into one of parabolas. This difficulty is augmented when

he discovers that the movements of his eyes, which were part of his former existence, suddenly cause the curved outside world to squirm like writhing snakes. Thus the newly elected aphakic regards a door through which for years he has been accustomed to pass without misadventure and, to his amazement, he finds the jambs in each side curve in toward the middle and leave an aperture only a few inches wide at the center, through which all reason tells him it will be impossible to wedge his portly person.

When mature thought finally persuades him that this is an optical illusion, and he timidly advances to make the test, he finds to his delight that as he approaches the opening, the curves recede gracefully and invitingly to his approach and he finds easy and unimpeded passage.

Similarly, when entering a high room with tall columns such as a hotel lobby or a railroad station, he finds the supporting columns bending and waving precariously and he is immediately convinced that by trespassing in such a manifestly shaky edifice, he will accentuate the instability and invite disaster. He fears that he will emulate Samson at Gaza, where in revenge for the loss of his own eyes, Samson precipitated the entire structure on the heads of jesting Philistines, and incidentally upon his own!

Gradually he learns the secret of persuading the outside world to remain in a properly upright position and abandon its sinuous behavior. The secret consists in holding his eyes motionless, his gaze fixed through the optical center of the correcting lens, and to move his head slowly to look at any desired object not in his direct view. When this simple trick is mastered, the spherical aberration disappears, and, once gone, can only be elicited and reproduced with difficulty.

With mastery of false orientation and spherical aberration, the next step in the thorny pathway of the new aphakic is the co-ordination of manual movements with the new visual imagery. The most elementary tasks—sharpening a pencil, carving a fowl—are done only with a sense of insecurity and clumsiness. It seems hopeless to the victim of cataract surgery that he will ever recover his former feeling of confidence or achieve again any manual dexterity for a technical procedure. Nothing can restore his confidence except constant practice. Self-assurance and the cajolery of his friends and admirers are unavailing. There is nothing to do except patiently repeat some manual task until confidence is again regained.

For many patients small jig-saw puzzles, Japanese block puzzles, and the like, are of decided value, teaching the individual how to handle objects and at the same time tickling his ego with a sense of accomplishment when the puzzle is solved.

One aphakic surgeon met the problem in a peculiar way. Fortunately, this individual lived during the summer on the water where crabs were plentiful and he himself has a weakness for their succulent meat. The picking of a hard-shell crab can either be a rough-and-ready procedure accomplished with a hammer, a gouge, and one's teeth, or it can be promoted to the level of a surgical operation, carefully removing shell, cartilage, and cell membranes without damage to the underlying meat and excavating each cell thus opened with the same precision a dentist would clean out a cavity.

The industrious pursuit of this latter procedure occupied the surgeon several hours each morning, resulted in a steadily improving co-ordination between manual manipulation and his new visual perception, and provided a steady supply of fresh crabmeat far beyond his household's capacity to consume. Thus, when the news spread through the neighborhood that a daily supply of free and surgically-prepared crab meat was available for the asking, the surgeon suddenly found himself enjoying popularity of a degree never before or since attained.

Thus the newly created aphakic can be assured that his three most obvious troubles —false orientation, spherical aberration, and lack of co-ordination—can ultimately be overcome with time and practice.

There remain two other difficulties that no

amount of time or practice can ever overcome and which must be endured as perpetual crosses. These are the limitation of the visual field due to the ring-scotoma and the continual but necessary adjustment of the aphakic correction.

It is well known that the magnified central visual field seen through the optical center of the glass overlaps and blots out a portion of the dimmer peripheral field and so produces a ring scotoma, which at 33 cm. subtends an area from about 35 to 55 degrees depending on the size of the spectacle lens. At ordinary reading distance, with a field of approximately 70 degrees or 40 centimeters in diameter, the aphakic is unconscious of the scotoma. Beyond 20 feet the field is also sufficiently wide to permit driving a car and the scotoma presents no problem. For intermediate distances, especially between two and 10 feet, the presence of the ring scotoma imposes a social handicap which cannot be overcome.

In ordinary group conversation, faces pop in and out of the blind area with the annoying insolence of a jack-in-the-box. Constant collisions with chairs or individuals inconsiderately injecting themselves into the blind field become a matter of course and a string of apologies becomes automatic. Going up and down stairs the aphakic must look at the steps to avoid falling and to learn when to stop ascent or descent, but this is at the expense of colliding with any innocent stranger who is thoughtless or reckless enough to be going in the opposite direction.

Crossing a street with a green light the unfortunate aphakic is at the mercy of any motorist who chooses to turn into his pathway. He can well sympathize with John Hunter who said of his own cardiac pathology, "My life is in the hands of any rascal who chooses to worry me." This infirmity cannot be cured; it must be endured. All the aphakic can do is to throw himself upon the mercy of his friends—but without asking for sympathy!

The second difficulty is the annoyance of cataract glasses. Volumes have been written on the aphakic correction and few have contributed materially to the solution of the problem. With each individual, within certain limits, the selection of the best lens for his individual needs is largely a trial-and-error procedure. There are certain general principles which unfortunately are learned only through bitter personal experience.

First, the greater the base-curve of the correcting lens the larger the visual field, but the greater and more troublesome the peripheral spherical aberration and the less useful the enlarged field. Within the average + 10.0D. sph. to + 13.0D. sph. range, a — 3.0D. spherical base curve affords the best compromise.

Second, for the bifocal addition, ignoring all arguments over indices of refraction, the flat or square top segment is vastly preferable to a spherical or rounded addition. The aphakic invariably prefers the upper portion of his add, avoiding use of the lower portion on account of prismatic deviation and peripheral spherical aberration incident to the strong plus lens. For this reason, the trifocal lens is of little value, the lower and stronger add is so low it is almost useless.

Third, the glasses must be accurately centered and adjusted. Since the optically active aphakic uses only the optical center of his lens, any maladjustment of the pupillary distance introduces at once a prismatic error which greatly reduces visual efficiency. Similarly, a fraction of a millimeter in the vertical adjustment produces a similar error and, since the aphakic uses only the upper portion of his add, if one lens is a fraction of a millimeter lower than the other, the aphakic may suddenly find he is using only monocular vision for his close work.

Lastly, the difference of less than a millimeter in distance of the lens from the anterior surface of the cornea may make a difference of almost a diopter in the refraction, depending on the strength of the aphakic correction. After the correcting prescription is filled and adjusted by the optician, the pa-

tient must again be seen by the ophthalmologist to determine if the finished and adjusted glasses give the maximum of vision, or if one lens must be set in or set out.

And so at long last the aphakic's refraction correction has become stabilized, his glasses have been properly fitted and adjusted, he has overcome the difficulties of false orientation, spherical aberration, and manual co-ordination. He is now launched forth on his aphakic career for the remainder of his days, and, barring his difficulty with his visual field limitation, all is supposed to be well. But alas, he has one more constant worry. His glasses do not stay adjusted. He puts them down every time he bathes or washes his face, he gropes for them, often in an unaccustomed place, to put them on again. Frequently they are knocked into the wash bowl or off the bathroom shelf in his efforts to recapture them. They rarely or never break, but they constantly become bent out of adjustment.

When this happens, his only resource is to have on hand a supply of spares and, when reduced to his last pair of adjusted lenses, to seek the aid of a friendly and skillful optician, have the entire works readjusted, and then begin all over again. By following this procedure, provided the bridge of his nose and the back of his ears can tolerate the weight of his correcting lenses, he can win through to a life of comparative activity and visual comfort.

From the viewpoint of the ophthalmologist, the postoperative troubles of an aphakic present a duty and an interesting problem. The duty of the ophthalmologist is to advise the new aphakic of the difficulties which lie in store for him and how best to meet the readjustment problem. The problem concerns the elderly individual without great visual requirements whose vision is reduced only to the 20/70 or 20/100 level. Is it proper to subject him to the visual and physical reorientation incidental to aphakia for the sake of the improved central visual acuity? The question is a pertinent one and cannot be answered yes or no. It is an individual question with every patient and should be carefully considered by the ophthalmologist on the basis of the individual's visual requirements and his physical and mental status before surgical interference is advised.

CORRESPONDENCE

Rose Bengal test

Editor,

American Journal of Ophthalmology:

I should like to comment upon an article by Kronning, which appeared in the September, 1954, issue of The American Journal of Ophthalmology on "Conjunctival and corneal stainability." In it he quotes a paper of mine (Forster: Arch. Ophth., **45**:419, 1951, "The Rose Bengal test in the diagnosis of deficient tear formation"). He disagrees with my statement that the preliminary use of tetracaine (pontocaine) does not produce false positives in the Rose Bengal test for keratoconjunctivitis sicca.

He reports tests with various anesthetics, including tetracaine, in which he used two or three drops of the anesthetic solution instilled into an eye three times at one-minute intervals for a total of six to nine drops. He then instilled Rose Bengal solution without removing the excess dye by injection and found corneal and conjunctival spotting. This he calls a positive test and concludes the false positive tests are likely when using preliminary topical anesthetics.

His method of using anesthetics is in no way comparable to mine. One drop of 0.5 or 1.0-percent tetracaine is adequate for surface anesthesia. Then a drop of 1.0-percent Rose Bengal solution is instilled and the excess dye removed by injection after 15 seconds, as with a fluorescein test. This is the method originally recommended by Sjøgren from whose clinic Kronning's paper comes.

A clinically positive Rose Bengal test done in this manner in early cases of keratoconjunctivitis sicca is a grossly visible one with

diffuse rose staining of the exposed areas of the conjunctiva and in severe cases the cornea too. This was described in my article. I have never seen one drop of tetracaine applied before the test produce such a picture as this. Therefore, I do not think that a false positive test from tetracaine need be considered unless the patient had a severe allergic reaction to tetracaine.

This is an important point because the instillation of Rose Bengal (1.0-percent solution) without preliminary surface anesthesia is a somewhat painful procedure, whereas with anesthesia it is a good practical office test. Kronning's article is misleading in this respect. His findings are not comparable with the clinical test I have described. I should not like to see this test abandoned because of this. Preliminary surface anesthesia does not destroy its value, renders it essentially painless, and it should continue to be used.

(Signed) H. Walter Forster, Jr., M.D.
Philadelphia, Pennsylvania.

Editor,
American Journal of Ophthalmology:

In a paper published in the Transactions of the Ophthalmological Society of Australia, 1951, page 27, Sjøgren says:

"Here it may be appropriate to point out that sometimes it may be possible to provoke a picture which in regard to stainability resembles Keratoconjunctivitis sicca, namely, by using a local anesthetic such as cocaine, pantocaine, diocaine, or something similar in the eye. Some persons are hypersensitive to certain of these drugs and this causes the death of the epithelial cells. If in such a case Bengal Rose is dropped into the eye, the latter is stained as in Keratoconjunctivitis sicca. Thus, it should be remarked that local anesthetics must never be used in examinations for the existence of Keratoconjunctivitis sicca."

The purpose of my investigation was to find out how often during which circumstances such a damage could be found in the epithelial cells after using an anesthetic.

The stain which is obtained with fluorescein depends upon the fact that the dye has an affinity for spots more or less denuded of epithelium. It is not taken up by the cells or their various parts and therefore provides no clue as to the condition of the cells. When using "vital-staining" with Bengal Rose, methylene blue, scarlet red, and so forth, the dye is absorbed by the cell itself. The occurrence of nuclear staining here is a sign of the death of the cell. The diffuse plasma staining likewise confirms this. (In contrast to this, the protoplasm of living cells takes on a granular stain—if staining occurs at all—and the nucleus remains unstained.)

Sometimes it can be seen that such an epithelial cell becomes forced out of the cell group and is adherent to the surface by a side or by a corner only. If the conjunctival fluid is microscopically examined, such cells are discovered in it and after a not too long time all colored cells are gone. It is obvious that when you irrigate the eye after instillation of the dye a great many of these colored and dead cells are removed, and so in slight cases of keratoconjunctivitis sicca, it will perhaps be impossible to get the diagnosis. Sjøgren has never recommended that the excess dye should be removed by injection as with a fluorescein test—it is just what he always has told us *not* to do!

The instillation of a one-percent Bengal Rose solution is a somewhat painful procedure if there is a pronounced keratoconjunctivitis sicca. In slight cases, however, as in sound eyes, it is not painful at all and surface anesthesia is quite unnecessary.

(Signed) Eric Kronning,
Vänersborg, Sweden.

BOOK REVIEWS

DOCUMENTA OPHTHALMOLOGICA. Advances in Ophthalmology. Edited by G. von Bahr, J. ten Doesschate, H. Fisher-von Bünau, J. François, H. Goldmann, G. Lo Cascio, H. K. Müller, J. Nordmann, A. J. Schaeffer, and A. Sorsby. The Hague, W. Junk, 1954, Vols. VII-VIII. 758 pages, no index. Price: 125 Dutch guilders.

Volumes seven and eight, bound together, continue this excellent series of highly scientific and important contributions. The volume is dedicated to the late Prof. J. van der Hoeve whose many valuable contributions to ophthalmology revealed a catholic interest in this field, and whose excellent memorial obituary, written by M. C. Colenbrander, begins the volume.

The first part is devoted to the report of an international meeting on the retinal circulation. Streiff of Lausanne discusses the value and precision of the Bailliart ophthalmodynamometer (French). Coudau and Planques of Toulouse describe very well the arterial retinal circulation in arterial hypertension (French). Weigelin of Bonn writes on the evaluation of the intracranial circulation by measuring the retinal arterial pressure (German). A. Fritz of Brussels has a splendid article on the physiopathology of the retinal capillary and venous circulation (French). The symposium is concluded by Bailliart, whose work on retinal circulation is known throughout the world.

The second part is the report of the Netherlands Symposium on Strabismus (all in English). Fischer and Wagenaar's paper on binocular vision and fusion movements is noteworthy. Van der Hoeve's paper on amblyopia and squint discloses much study and reflection. This master of many languages expresses himself most precisely in English and his contribution is worthy of careful study. Waardenburg's subject, strabismus and heredity, discloses several new facts of importance. Weve, the master surgeon, describes the operative treatment of strabismus, while Zeeman balances the subject with a discussion of the conservative treatment of strabismus. Roelofs handles the difficult subject of optokinetic nystagmus with considerable skill.

The last paper by Yap-kie-tiong has nothing to do with the subject of strabismus. However, this paper on experimental keratoplasty, with particular attention paid to the role of the corneal endothelium in keratoplasty, is excellent. It is a long paper and valuable to all surgeons interested in the subject.

Documenta Ophthalmologica deserves a wide distribution because of the scientific worth of its contributions.

Derrick Vail.

RÖNTGENDIAGNOSTIK DES SCHÄDELS. By Prof. Dr. Willy Loepp and Prof. Reinhold Lorenz. Stuttgart, Georg Thieme Verlag, 1954. 579 pages, 613 illustrations, bibliography. Price: $23.10.

Roentgen Diagnostics of the Skull is not the result of co-operation between the two authors listed. Loepp had spent many years collecting material for the book. After the end of the last war, he had to leave his home in Eastern Germany and, as a result, most of his films were lost. Fortunately, he succeeded in supplementing what was left of his own collection with suitable films from a number of institutes in Western Germany. After Loepp's death, Lorenz was entrusted with the fulfillment of the life-long ambition of a colleague he had never met.

The result of this labor of love is a unique volume equally useful to the roentgenologist, the ophthalmologist, the neurologist and neurosurgeon, the otolaryngologist, and the oral surgeon. It treats not only the roentgenologic aspects—physiologic as well as pathologic—but also the clinical symptoms and the histopathologic findings. Thus, it affords the roentgenologist an easily accessible reference work for his daily routine. At the same time, it should be extremely valuable

to the clinician seeking information concerning a specific roentgenologic problem.

The ophthalmologist will find the chapter on the orbit extremely interesting. He will also enjoy the chapter on defects of the skull due to disturbances of growth and the chapter on hereditary diseases where he will find detailed presentations of oxycephalus, hypertelorism, Crouzon's disease, and mongolism. The discussion of the meningiomas should be singled out as a model presentation of a topic that is of greatest interest to the ophthalmologist. Here, as in most other chapters, will be found a happy correlation between clinical and roentgenologic facts.

Study of the lengthy presentation of the pathology of the sella will not only be instructive for the ophthalmologist but also enlightening, because the author discusses the taxing and often puzzling problems that confront the roentgenologist in the interpretation of sella changes.

Needless to say, the most important chapter for our specialty is that on the orbit. There is an adequate discussion on the normal appearance of the orbit in its various exposures. The presentation of the pathologic changes of the optic canal emphasizes the importance of the causative process for the characteristic appearance as seen on the flat film.

Comberg's method of localization of intraocular foreign bodies is described in great detail. The advantage of this method is that it does not require the special apparatus designed by Sweet for his procedure. However, it necessitates complicated corrections and calculations before the exact position of the foreign body can be plotted. According to the Sweet method, the position of the foreign body can be transferred to the scheme directly from the film. Considering this tremendous advantage, it is difficult to understand why this latter method has not even been mentioned.

Obstruction of the tear passages is determined by the use of a contrast dye. This is one of the few instances in the book where the use of contrast media is included in the discussion.

Undoubtedly, this volume is most valuable to the clinician who is forced to interpret roentgen films without the co-operation of the roentgenologist. Although such a situation might not arise too often in this country, in Germany it is quite prevalent to have an eye department in a separate building with its own X-ray facilities. There, the ophthalmologist has to read his own films.

It is a pleasure to leaf through this book and marvel at the luxurious illustrations. The author and the publisher can be congratulated for an accomplishment that is destined to serve as a standard reference for many years to come.

Stefan Van Wien.

CLINIQUE D' L'HUMEUR AQUEUSE PATHOLOGIQUE. By Florian Verrey, Neufchâtel, Delachaux and Niestlé, 1954. 269 pages, 202 figures (27 in color), bibliography, and index. Price: 64 Swiss francs.

The author, well known in the United States, has developed, with Marc Amsler, a method of investigation of the aqueous humor in health and disease. Almost every ophthalmologist is familiar to some extent with these studies, and many recall the fascinating film on this subject that was shown before the XVI International Congress of Ophthalmology in 1950, and before the Academy of Ophthalmology and Otolaryngology, also in 1950, and since then before state and local groups.

This book, beautifully illustrated, brings all the information together. The chapters include the technique for examination of the pathologic aqueous, with elaboration of matters pertaining to immunology, bacteriology, and cytology of the aqueous. The second part of the book describes the reactions of the eye to anterior-chamber puncture, and covers many clinical conditions, such as keratitis, uveitis, heterochromia, perforating wounds, glaucoma, cataract, postoperative in-

fections, intraocular tumors, and so forth.

A study of the aqueous humor in disease or aging of the eye is a logical and fruitful pursuit. Much needs to be learned and some controversy is still to be expected when a new technique is advocated. It may well be that diagnostic puncture of the anterior chamber will become a standard clinical method of investigation.

Derrick Vail.

THE RAUWOLFIA STORY. Summit, New Jersey, Ciba Pharmaceutical Products, 1954. Paper-bound, 63 pages, bibliography. Price: Free on request.

Rauwolfia serpentina, a small shrub with snakelike roots found in the hills of India, was first described by Dr. Rauwolf of Augsburg in 1582. Although valued for centuries in Indian folk medicine, the physicians of India have only investigated its therapeutic possibilities since 1931. An impressive article by Vakel of Bombay in the *British Heart Journal* in 1949 excited the interest of the western world, and in 1952 the Ciba firm isolated a pure alkaloid, reserpine, responsible for the sedative and antihypertensive activity of the crude drug. Reserpine induces a quiet tranquillity without grogginess, a gentle and slow reduction of blood-pressure, and an improved appetite. The alkaloid probably acts directly on the hypothalamus causing a constriction of the pupil, a moderate slowing of the heart, and increased activity of the digestive tract. The drug is nontoxic, well tolerated over prolonged periods, and allays, in particular, the nervous symptoms of high blood-pressure—insomnia, headache, giddiness, palpitation, tinnitus, vertigo, and constipation. This new sympatholytic remedy promises to be of aid in opthalmology in preventing excessive blood-pressure from blowing out blood vessels in the retina and in reducing the emotional tension that precipitates psychosomatic ocular disorders.

James E. Lebensohn.

LA SCLEROMALACIE PERFORANTE ET LES MALADIES QUI S'EN RAPPROCHEUT. By Robert Gros. Lyon, Maurice Fabre, 1953. 112 pages, five figures, index. Price: Not listed.

This work, a student's thesis, is an excellent review of a somewhat rare and not too well-understood disease. The author has collected 30 cases from the literature, and has intensively studied one case of his own. He shows that scleromalacia perforans can be absolutely differentiated from scleromalacia paralimbique, scleritis nodular necrosing, senile hyaline placques, and scleromalacia with porphyrinuria. Treatment consists of a graft of the sclera, which was successfully performed in the author's case.

Derrick Vail.

BOOKS RECEIVED FOR REVIEW

The following books have been received for review. Acknowledgement is made here because often there is a delay before a suitable review appears.

CONNECTIVE TISSUE IN HEALTH AND DISEASE. By G. Asboe-Hansen. Copenhagen, Enjar Munksgaard, 1954. Price: 50 Danish kroner.

HUNDREDTH YEAR CELEBRATION OF THE BIRTH OF PAUL EHRLICH AND EMIL V. BEHRING. Frankfurt am Main, Farbwerke Hoechst, 1954. 29 pages, 62 photographs. Price: Not listed.

EVALUATION OF ADJUSTMENT TO BLINDNESS. By Edward A. Fitting. New York, American Foundation for the Blind, 1954. 84 pages, bibliography. Price: $1.00.

SANDOZ ATLAS OF HAEMATOLOGY. Written and compiled by E. Undritz. English translation by A. M. Woolman. Basle, Switzerland, Sandoz, Ltd., 1952. Now available at cost ($7.00) as a service to the medical profession by Sandoz Pharmaceutical Company.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Rivas Bensusán, Jose. **Skiascopy with cylinders.** Arch. Soc. oftal. hispano-am. **14**:906-922, Aug., 1954.

This is a detailed description of the technique of sciascopy as developed by Lindner and Marquez without new material. Ray K. Daily.

Siebeck, Robert. **The labile crossed cylinder.** Klin. Monatsbl. f. Augenh. **125**: 467-472, 1954.

This crossed cylinder (Astikorrekt) is a complementary method for the usual stabile crossed cylinder method. When adjusting the strength of the cylinder it is not necessary to change the sphere, change the cylinder and maintain the axis, but a single, small rotation of the Astikorrect gives the same optical result. However, the sphere may have to be rechecked. This can quickly be done with a rack of spherical lenses from −.50 to +.50. (2 figures, 4 references)

Frederick C. Blodi.

Westheimer, Gerald. **The design and ophthalmic properties of binocular magnification devices.** Am. J. Optometry **31**:578-584, Nov., 1954.

This is a theoretical and mathematical discussion of magnifiers to be placed well away from the eyes as in the Beebe loupe.

Paul W. Miles.

5

DIAGNOSIS AND THERAPY

Barraquer Moner, Joaquin. **Controlled vascular hypotension in ocular surgery.** Arch. Soc. oftal. hispano-am. **14**:890-905, Aug., 1954.

The pharmacology of hexamethonium bromide is reviewed and its application to eliminate bleeding in ocular surgery is described. In general or local anesthesia, the systolic blood-pressure is reduced to 60 by the intermittent intravenous administration of hexamethonium bromide by the anesthetist. Barraquer's report is based on 50 ocular operations, five of which were performed under general anesthesia and the rest under basal and local anesthesia. The author concludes that this procedure controls hemorrhage in ocular surgery, and permits a more rapid and less traumatic procedure. Postoperative hematomas are avoided, the surgical loss of blood is reduced, and the

postoperative recovery is smoother and more rapid. This procedure is contraindicated in essential hypotension and arteriosclerosis. (14 figures, 20 references) Ray K. Daily.

Converse, John M. **Technique of bone grafting for contour restoration of the face.** Plast. & Reconstruct. Surg. **14**:332-345, Nov., 1954.

In the author's series of contour-restoring bone grafts of the face, the original shape of the graft has been preserved and no changes in shape have occurred after the graft has become consolidated to the host bone. This is true despite the extensive cellular repopulation and demineralization which transpires within the graft. The author reviews the techniques of bone grafting or contour restoration of the frontal bone, the nasal pyramid, the zygomatic bone, the maxilla, the mandible, and the floor of the orbit. The author describes the advantages of the intra-oral approach to the maxilla and zygoma in some instances. Each of the methods is illustrated by an excellent drawing. Alston Callahan.

Dollfus, Marc-Adrien. **Radiation therapy of ocular and orbital tumors.** Ophthalmologica **127**:226-242, April-May, 1954.

Radiation therapy of epibulbar or orbital tumors should not be undertaken without previous biopsy or biopsy puncture to determine the exact nature of the tumor and its degree of radiosensitivity. Only in the case of intraocular tumors such biopsy puncture is not permissible.

Since malignant melanomas of the uvea (iris or choroid) are insensitive to radiation, any attempt to try such treatment just means a loss of precious time. The opposite situation prevails in cases of metastatic tumors of the choroid.

The following rules should apply to the radiation therapy of retinoblastomas. It should never be used in unilateral cases where enucleation yields cures in 70 percent of the individuals treated. If both eyes are affected simultaneously and to a similar degree radiation therapy has been tried by the author, but uniformly ended in failure. If one eye is more extensively affected this eye should be enucleated. If the tumor has invaded the optic nerve the enucleation should be followed by radiation directed at the tip of the orbit. Radiation therapy should never be undertaken if the retinoblastoma has involved more than one-third of the retina or has reached a thickness of 6 mm. or has invaded the disc.

For details of the technique the reader is referred to the author's monograph (Le gliome de la retine et les pseudogliomes, Masson et Cie, Paris 1953). For a good many years the author has been associated with the Fondation Curie in Paris and a radiologist named Baclesse. His technique of radiating retinoblastomas is similar to that of Reese and Martin. A total dose of 12,000 r is administered through an anterior and a lateral (3 × 2 cm.) portal. The individual daily dose is 150 to 200 r to one portal only. In 20 to 30 treatment days about 2000 r are applied through each of the two portals. One such series of treatment is usually followed by a rest period of one month.

Combining his results with those of A. B. Reese, Dollfus arrives at the following figures:

five-year cures with some vision	11.5%
less than five-year cures with some vision	28.5%
five-year cures without vision	26.0%
deceased	34.0%

Stallard's method of radiotherapy of retinoblastomas by means of small carriers placed against the sclera overlying the tumor gives excellent results in cases of well circumscribed small lesions.

The epithelioma of the bulbar con-

junctiva occurs in two forms: a well circumscribed tuberous form responding well to contact-radiation with radium, and a more diffuse form for which semi-penetrating X-rays are the preferred form of treatment.

With regard to orbital tumors, the author refers to the monograph by Guy Offret (Les tumeurs primitives de l'orbite et leur traitement, Masson et Cie, Paris, 1951). The eyeball is protected by a small lead disc placed in the axis of X-ray beam close to the tube. A good many orbital tumors are radiosensitive, particularly the lymphomas, the reticulosarcomas and the hemangiomas. In children, however, after dramatic subsidence of the initial tumor, recurrences set in which unfortunately, are resistent to further radiation.

Very characteristic is the response of the cylindromas of the lacrimal gland to X-ray therapy. The initial tumor seems to disappear, but rarely is a cure accomplished. Slowly and inconspicuously metastases develop in the lungs or under the skin of the face.

The last section of the review deals with the complications of radiation therapy of the eye: cataract, corneal ulcers, iridocyclitis with hypertension, retinal hemorrhages and sarcoma of the skin.

Peter C. Kronfeld.

Harms, H. **Quantitative perimetry applied to a case of tumor in the sellar region.** Ophthalmologica **127**:255-261 April-May, 1954.

Topographic perimetry (cfr. Bair Am. J. Ophth. 23:1409-1940) implies determination of the outlines or borders of retinal areas at which a particular target becomes visible or invisible. Quantitative perimetry implies the determination, by varying size and intensity of the target, of the sensitivity of a representative number of retinal areas. In the author's instrument a projector-like device projects the variable stimulus on a background of variable brightness. The value of the quantitative method is demonstrated in a case of tumor of the seller region. (7 figures) Peter C. Kronfeld.

Knuesel, O. **Visualization of lymphatics in the bulbar conjunctiva.** Ophthalmologica **127**:298-301, April-May, 1954.

Certain structures made visible in the human bulbar conjunctiva by vital staining with (instilled) trypan blue or fluorescein are interpreted as lymphatics. (9 figures) Peter C. Kronfeld.

Koenig, F. **Orbitography.** Ophthalmologica **127**:283-287, April-May, 1954.

The retrobulbar injection of nosydrast, a radio-opaque substance similar to but less toxic than thorotrast, can be very helpful in the diagnosis of orbital lesions. The method is not entirely harmless and should only be used if the usual clinical methods have failed to give the information necessary for proper management of the case (9 figures)

Peter C. Kronfeld.

Offret, G., Gilles, E., and Blanchot, F. **The role of orbital tomography with air injection in ophthalmology. Part I.** Arch. d'opht. **14**:259-273, 1954.

The authors have found tomography (i.e., roentgenographic photography of a selected plane in the body) of definite value in the study of orbital conditions. After a preliminary examination of the literature, from the initial study in 1927 of Staning and Herrenschwand to the most recent study of Friedmann in 1947, they review the topography of the orbit, the principles of tomography, and the technique of air injection. They then describe the results obtained by this method in normal subjects. They conclude that only by this method is it possible to visualize the globe, Tenon's capsule, the

optic nerve, and the extraocular muscles. (6 figures) Phillips Thygeson.

Streiff, E. B. **The surgical treatment of the malignant tumors of the eye and its adnexa.** Ophthalmologica **127**:262-279, April-May, 1954.

The ophthalmologist is tempted to include among the malignant tumors of the eye not only those that are malignant by the usual histologic criteria, but also those which, irrespective of their histologic character, cause serious impairment of ocular function ("functional malignity").

The principles underlying surgical treatment of the various malignant tumors of the eye are presented. Some strikingly good results of radical excision of lid tumors and plastic repair are shown in clear photographs. Two unusual cases of malignant limbic tumors simulating pterygia are reported. The ab externo incision is recommended for the surgical removal of iris tumors. The tumor itself should not be touched. Tumors of the ciliary body call for enucleation and so do the melanomas of the choroid. There, even after enucleation, the average length of symptom-free life is only about three years. The few reported cases of symptom-free life for 10 to 15 years after the diagnosis of malignant melanoma had been made clinically and enucleation had been refused, were probably benign or relatively benign melanomas. Biopsy puncture of a melanoma uvea has only rarely given us a clear picture of the degree of malignancy of the tumor.

In cases of malignant melanoma in the only seeing eye or if the patient refuses enucleation one may resort to Weve's method of electrocoagulation of the tumor if the following conditions are fulfilled: The tumor must not exceed a thickness of 5 mm. or a diameter of 9 mm. The ciliary body must not be involved and the sclera must not be perforated. The tumor must not be close to the optic nerve. Streiff does not believe that one should recommend the surgical excision of a choroidal melanoma as Lindner, Leonardi and Stallard have done.

Two unusual tumors involving the optic nerve are reported in some detail. In the first case a tumor that originated in the distal portion of the left optic nerve including the disc, was treated by enucleation and removal of 12 mm. of optic nerve and diagnosed as an endothelioma. A local recurrence a year later was treated with X-rays. There followed a period of 23 years of symptom-free life. Then, gradually, headaches set in accompanied by a visual field defect in the right eye. X-ray examination revealed enlargement of the left optic foramen and a shadow in the left frontal area. The surgical exploration disclosed a meningioma of enormous size that had originated from the stump of the left optic nerve. The second case was one of a schwannoma of the optic nerve treated successfully by two-stage excision of the tumor (first intracranial and then orbital).

Most orbital tumors, however, originate in the orbit, that is in the domain of the ophthalmologist and not in that of the neurosurgeon or the otolaryngologist. The usual surgical approach is the orbitotomy through the skin overlying the orbital margin; for the very deep and large tumors, the Kroenlein procedure is recommended.

There is no routine method of treatment for the orbital pseudo-tumors. The biopsy which is usually necessary to establish the diagnosis, may aggravate the external symptoms, that is exophthalmos, lid and conjunctival edema.

The final section of the review deals with the surgical correction of the defects caused by the surgical treatment of malignant tumors. The author has been particu-

larly interested in implants after enucleation and has included some of his experiences in this review, although he considers implants strictly contraindicated after enucleation for malignant tumors.

Of the many substances used for implants the German plastic polyviol seems to be best tolerated (extrusion in only 10 percent of the cases, cfr. Am. J. Ophth. 35:1542, 1952). "As for the other substances which American optical firms have made into differently shaped implants and recommended in impressive advertisements, their failures have been equally impressive." The author does not consider any of his experiences with implants as really valid. The method that to him appears "most normal, perhaps truly physiological" is that of Strampelli (Bull. Soc. franc. Ophtal. 64:356, 1951) consisting of a mushroom-shaped implant to which conjunctiva and muscles are sutured and whose stem is covered by a buccal mucous membrane graft.

The author's procedure of restoration after exenteration of the orbit is as follows. Whenever possible he saves the lids or at least their skin- muscle layer. Eight days after the exenteration he lines the orbital cavity with a full-thickness skin graft taken from the inner aspect of the thigh. The cavity is filled for a week with a mould made of Stent's dental compound. The final prosthesis is a ball of pure rubber which is removed daily to cleanse the large cavity. The artificial eye is mounted on the rubber-ball.

The comments on Streiff's paper by the earlier speakers in this symposium are of interest. Dollfus repeated his original statement of the excellent response of lid tumors to radiation. Surgery becomes necessary in those cases of recurrence of the tumor in which a second course of radiation would not be advisable because of the amounts of radiation already administered. Dollfus considers implants after enucleation of eyes harboring malignant tumors permissible. Miescher restated his view that the only limit to successful radiation therapy of lid tumors is invasion of the bone. Tumors of the inner canthus are not unsuitable for radiation. Biopsy is safe in cases of basal and squamous cell carcinomas, but very dangerous in cases of melanoma. The melanomas of the globe may represent an exception to that otherwise very generally applicable rule. The melanomas of the lids or of the anterior surface of the globe require larger amounts of radiation than the unpigmented tumors, but are not radioresistant. (18 figures)

Peter C. Kronfeld.

Valetta, J. **General anesthesia in ophthalmology.** Arch. d'opht. **14**:274-279, 1954.

The author reviews the history of anesthesia in ophthalmology and the recent advances made in local anesthesia by retrobulbar and periorbital injection. He considers in some detail the imperfections of local anesthesia and the types of patients, e.g., young children, with whom general anesthesia is mandatory. After a consideration of the various general anesthetics, the author stresses the advantages of intravenous barbiturate and outlines the technique of administration. He then notes that in ophthalmology there seems to be no advantage in having the duration of the anesthetic coincide with the duration of the operation. In contrast, he stresses the value of postoperative sleep in promoting wound healing and hemostasis. For young children the advantage of rectal administration of barbiturates is mentioned. The accidents of anesthesia are described and methods of control outlined. Finally, new refinements of general anesthesia, such as the use of hypotensive drugs, hypothermia, and intravenous procaine, are considered with their indications and contraindications.

Phillips Thygeson.

6

OCULAR MOTILITY

François, J., and James, M. **Retinal correspondence and strabismus.** Ann. d'ocul. **187**:793-804, Sept., 1954.

It is generally stated in the literature that abnormal retinal correspondence occurs in from 40 to 80 percent of cases of strabismus. The authors are convinced that this figure is too high. In a study of 1,300 cases of strabismus, they found true abnormal retinal correspondence in only 13 cases (1 percent), loss of normal retinal correspondence in 9 cases (0.7 percent), eccentric fixation in 19 cases (1.46 percent), loss of central fixation in 69 cases (5.3 percent), and amblyopia in 738 cases (56.8 percent). (6 figures)

John C. Locke.

Piper, H. F. **Strabismus as a pathologic asymmetry of the visual sense.** Klin. Monatsbl. f. Augenh. **125**:385-400, 1954.

This review gives a survey of some selected recent articles on strabismus. No critical evaluation is attempted, but the asymmetrical factors which could produce manifest deviations are stressed. Among these factors are: anisometropia, aniseikonia, anisophoria and anisodominance. (69 references) Frederick C. Blodi.

Zubczewski, Adam. **Surgical treatment in paralysis of the lateral rectus muscles.** Klinika Oczna **24**:131-132, 1954.

The results of surgical treatment of paralysis of the lateral rectus muscles in four cases are presented. O'Connor's method was used. Improvement was from 15° to 28° of abduction. (1 figure, 4 references) Sylvan Brandon.

7

CONJUNCTIVA, CORNEA, SCLERA

Amsler, Marc. **Keratoconus and military service.** Ophthalmologica **127**:305-309, April-May, 1954.

In a case of keratoconus, recognized after three weeks of service in the Swiss army, one ophthalmologist's opinion was that an acute exacerbation may have occurred as the result of the radical change in living conditions. In response to this opinion Amsler reports that he has found, with his method of recording the shape of the cornea (keratography), a state of mild keratoconus in the patient's father, as well as in the father of another young man with pronounced keratoconus recognized after 11 days in the Army. The mode of hereditary transmission of keratoconus varies. Some pedigrees show recessive and some irregular dominance. (2 figures) Peter C. Kronfeld.

Buerki, E. **Another case of cystinosis with corneal changes.** Ophthalmologica **127**:309-314, April-May, 1954.

Cystinosis is a rare inborn disorder of amino acid metabolism, characterized by cystinuria and deposition of cystin in most tissues, including cornea and conjunctiva. One typical case in a one-year-old infant is reported (cfr. Am. J. Ophth. 35:1596, 1952). (4 figures, 9 references) Peter C. Kronfeld.

Cuendet, J. F., and Michels, V. **The use of fibrin films in the treatment of keratitis.** Ophthalmologica **127**:301-304, April-May, 1954.

Fibrin films formed on the cornea by the instillation of thrombin and human plasma constitute an adjuvant of great value in the treatment of corneal ulcers of almost any etiology. The authors report particularly good results in traumatic and herpetic keratitis and in corneal burns. (4 references) Peter C. Kronfeld.

François, Jules. **A further contribution to the study of scleromalacia perforans.** Ann. d'ocul. **187**:689-725, Aug., 1954.

After the presentation of a case of scleromalacia perforans in a 78-year-old

woman with chronic polyarthritis, the author gives a detailed review of what is known about scleromalacia perforans, nodular necrosing scleritis, spontaneous intercalary perforation of the sclera, senile hyaline scleral plaques, and scleromalacia with porphyrinuria. In the author's case, histopathologic examination of one eye showed nodules in the sclera analogous to rheumatoid nodules. These consisted of a central focus of necrosis, surrounded by a zone of fibrillar degeneration, surrounded in turn by granulation tissue containing epithelioid cells, giant cells, lymphocytes, and plasma cells. Expulsion of these foci through the conjunctiva results in the characteristic scleral perforations. (16 figures, 93 references) John C. Locke.

Hart, E., and Dimitriou, T. E. **Irradiation of the spleen in vernal catarrh.** Klin. Monatsbl. f. Augenh. **125**:440-444, 1954.

In 50 patients with vernal catarrh the spleen was irradiated. The results were excellent and lasted at least one summer. (24 references) Frederick C. Blodi.

Hartmann, Karl. **Corneal damage with tear gas.** Klin. Monatsbl. f. Augenh. **125**: 475-479, 1954.

A young girl was accidentally injured with tear gas shot from an alarm-pistol near at hand. The tear gas was chloracetophenon. Both corneas showed severe, deep, but temporary opacification. (1 figure, 9 references) Frederick C. Blodi.

Krwawicz, Tadeusz. **Intrascleral implantation of a pterygium.** Klinika Oczna **24**:127-130, 1954.

The author describes his method of pterygium operation. After separation of the head of the pterygium a vertical incision is made into the sclera about 6 mm. from the limbus. An intrascleral pocket is formed about 4 mm. deep, into which the head of the pterygium is placed and sutured. A sharply outlined scar is formed and there is no tendency to recurrence. (8 figures, 6 references) Sylvan Brandon.

Segal, P., and Zylo-Filipowicz, A. **Treatment of interstitial keratitis with local cortisone.** Klinika Oczna **24**:133-137, 1954.

Interstitial keratitis in five patients was treated with local applications of cortisone in addition to general treatment with penicillin and fever. The average duration of cortisone application was 21 days. There was rapid recession of signs and symptoms which recurred as soon as cortisone treatment ceased. The authors feel that the value of cortisone in the treatment of interstitial keratitis is only symptomatic. (10 references) Sylvan Brandon.

Seitz, R. **Ocular pigmentation in ochronosis.** Klin. Monatsbl. f. Augenh. **125**:432-440, 1954.

A 70-year-old man with endogenous ochronosis had the typical corneal and conjunctival pigmentation in the interpalpebral zone. A biopsy of the conjunctiva revealed granules of pigment in the connective tissue. There was no cellular reaction around them. (9 figures, 12 references) Frederick C. Blodi.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Bangerter, A. **Malignant tumor of the iris.** Ophthalmologica **127**:243-248, April-May, 1954.

The report concerns a case of malignant melanoma of the iris in a 26-year-old woman treated by surgical excision. The tumor occupied almost a whole quadrant of the iris and extended, gonioscopically, into the ciliary body. The surgical excision included 1. the full thickness and

the full meridional expanse of the ciliary body over the central two-thirds of the circumferential expanse of the iris tumor, 2. the superficial layers of the ciliary in the adjacent portions, 3. the deep corneal and scleral layers corresponding to areas 1. and 2., and 4. an iris sector considerably broader than the tumor. The postoperative course was uneventful. Two years later the eye was still in good order. In the discussion Goldmann reported a similar case treated successfully by radical surgical iridectomy and cyclectomy. Safar reported two similar cases treated successfully by electrocoagulation. (3 figures, 1 reference) Peter C. Kronfeld.

Bouzas, A. **Note on the prognostic value of results obtained by anterior chamber puncture. Method of Amsler and Verrey.** Arch. d'opht. **14**:387-390, 1954.

The author has employed the technique of the Swiss authors in a study of uveitis, particularly in a preoperative investigation of eyes with cataract complicated by an old uveitis. The results are tabulated according to the albumin content and the number and character of the cells. Bouzas was able to confirm the observations of Amsler and Verrey on the tendency to relapse of cases of uveitis which were clinically healed but showed abnormal aqueous. Phillips Thygeson.

Dufour, R. **Angioma of the choroid simulating a melanoma.** Ophthalmologica **127**:249-253, April-May, 1954.

In a 57-year-old man complaining of a visual field defect; an oval, gray, sharply outlined elevation, 4 × 3 disc diameters in size was found in the eyeground temporal to the macula. Examination with the fundus contact lens revealed a smooth-surfaced, gray mass under the slightly speckled retina. The mass was impenetrable to light passing in either direction (biomicroscopy or transillumination from behind). The eye was enucleated under the suspicion of melanoma. The pathologic examination revealed a hemorrhagic, intrachoroidal cyst with cystic degeneration of the overlying retina. The latter finding, as mentioned by Goldmann in the discussion, might be of differential-diagnostic value. (3 figures, 4 references) Peter C. Kronfeld.

Hudelo, A., and Maussion, L. **Choroidal detachment and placental inclusion.** Ann. d'ocul. **187**:737-738, Aug., 1954.

Detachment of the choroid should not be looked upon as a certainly benign condition; malignant types do occur. And placental inclusion, after an excessive initial popularity, does not deserve the oblivion and disrepute which now attend it. In 1953 the authors reported two cases of choroidal detachment cured after placental inclusion. They now report an additional two cases, one occurring after cataract extraction and one after an Elliot trephine operation, which had failed to respond to the usual methods of treatment but regressed dramatically after placental inclusion. John C. Locke.

Sedan, J., and Sedan-Bauby, S. **Longitudinal incision through the base of the iris, prior to iridectomy in occlusion of the pupil.** Ann. d'ocul. **187**:611-618, July, 1954.

In severe cases of seclusion or occlusion of the pupil with diffuse adhesions in the pupillary area, the authors advise a longitudinal incision in the base of the iris, prior to iridectomy. An ab externo limbal incision is made with Herbert's knife, followed by a longitudinal incision in the base of the iris with the same instrument. A very firm grasp of the iris is then obtained by passing one blade of an iris forceps through the iridotomy behind the iris, and the other blade in front, thus facilitating the inclusion of the iris base in the iridectomy. (8 figures)

John C. Locke.

9

GLAUCOMA AND OCULAR TENSION

Cristini, G., and Pentini, G. **Is iridencleisis a revascularization of the anterior uvea?** Rassegna ital. d'ottal. **23**:272-283, July-Aug., 1954.

The conception of an obstacle to the outflow of aqueous because of increased resistance of the anterior emissaries, or that of increased capillary pressure from vascular sclerosis does not satisfy the writer. The injection of India ink intravascularly demonstrated dilation of the small vessels of the iris, ciliary body and conjunctiva, and the development of capillaries connecting the incarcerated iris with the surrounding episcleral and conjunctival vessels, which explains the lowering of the ocular tension after iridencleisis. (6 figures, 15 references)

Eugene M. Blake.

François, Jules. **Cortisone and ocular tension.** Ann. d'ocul. **187**:805-816, Sept., 1954.

While the hypotensive effect of cortisone in most cases of uveitis with secondary glaucoma is undeniable, the author presents seven cases of chronic uveitis and one of discission of the lens in which the ocular tension was normal before local cortisone therapy, and a rise in tension was apparently directly due to the treatment. From his observations in this series the author concludes that hypertension due to cortisone does not generally appear until several months after the beginning of the use of the drug and it may begin after the uveitis is apparently cured. It is generally mild (30 to 40 mm. Hg) and without discomfort or objective signs and it tends to disappear immediately upon withdrawal of the hormone. The pathogenesis of the glaucoma is not known. It is not due to sodium chloride retention, since normal eyes never show an increase in tension even when enough of the drug is given parenterally to produce Cushing's facies. Gonioscopy shows no changes other than those usually found in uveitis. (8 figures, 9 references)

John C. Locke.

Leydhecker, W., and Niesel, P. **Statistical evaluation of the physiologic limits of provocative tests for glaucoma.** Klin. Monatsbl. f. Augenh. **125**:458-467, 1954.

This study is based on 976 provocative tests on healthy persons. The mean and the standard deviations were determined in each group. Values outside the double standard variation were regarded as questionably pathologic. Values outside the threefold standard variation plus 1 mm. Hg were regarded as pathologic.

In the caffeine test a rise of 6 mm. is suggestive and a rise of 9 mm. is certainly pathologic. For the water drinking test the corresponding figures are 8 and 10, for the homatropine test 8 and 12, for the lability test 9 and 11, for the vascular test 11 and 15 and for the priscoline test 11 and 14. In addition to the relative increase of intraocular pressure it is of value to know the absolute threshold. That is the value above which any reading must be regarded as pathologic. It is lowest for the caffein test (31) and highest for the priscoline test (41). (3 tables, 53 references)

Frederick C. Blodi.

McBain, Earle H. **Diagnosis and treatment of glaucoma.** California Med. **81**: 231-234, Sept., 1954.

Tonography is helpful in the diagnosis of doubtful cases of chronic simple glaucoma. It also gives a good indication of the status of the disease in a given eye. The water drinking test is useful in wide angle glaucoma.

The most useful miotic in the treatment of glaucoma is still pilocarpine. Carbachol is more potent but must be used in an anhydrous base ointment or in a solution of a wetting agent. DFP produces unde-

sirable side effects because of the hyperreactivity of the ciliary body and iris sphincter which it causes. These can be partly overcome by using pilocarpine first. Diamox is a carbonic anhydrase inhibitor that is effective when given orally. In many cases it produces at least a temporary lowering of tension in glaucomatous eyes, apparently by reducing the secretion of intraocular fluid. Its ultimate value in glaucoma remains to be seen.

The cyclodiathermy operation which has been modified somewhat by Weekers has had a recent increase in use but the long-term results have been somewhat disappointing. The importance of early operation in narrow angle glaucoma is becoming more and more apparent. After iridectomy the wound should be tightly sutured to insure the prompt reformation of the anterior chamber. (8 references)

Irwin E. Gaynon.

Stankovic, M., and Stankovic, I. **Can one avoid certain complications in fistulizing operations for primary glaucoma?** Ann. d'ocul. **187**:726-736, Aug., 1954.

The authors stress that hypertension in primary glaucoma is only one manifestation of a generalized disturbance. Surgical control of the tension is not synonymous with cure, since optic atrophy and visual field changes may continue postoperatively despite normal tension. When a fistulizing operation is indicated, however, the following technique will keep complications to a minimum. A conjunctival flap is dissected down to the limbus from above, after subconjunctival air injection, which facilitates the dissection, reduces the bleeding, and induces a mild anesthetic effect. A short scleral incision is made 1.5 mm. from the limbus, through which a small buckle of iris invariably prolapses permitting only a partial emptying of the anterior chamber. A perpendicular iridotomy is made in the prolapsed portion of the iris, which is left incarcerated, and the conjunctival incision is carefully sutured. Important details are maximal miosis at the time of operation, slow evacuation of the aqueous humor, incomplete emptying of the anterior chamber, minimal trauma to the iris, retention of an intact pupillary margin, and the use of atropine postoperatively. (3 figures)

John C. Locke.

10

CRYSTALLINE LENS

Barraquer Moner, Joaquin. **The technique of Ridley's operation.** Arch. Soc. oftal. hispano-am. **14**:867-885, Aug., 1954.

This is a detailed description of the technique without a report of cases or analysis of results. The author stresses the importance of thorough basal anesthesia, and a soft eyeball which he obtains by curarization. The lids are separated with lid elevators, a suture of the superior rectus is inserted, and firm fixation of the eyeball obtained. A large corneal section is made with the Graefe knife, cutting a conjunctival flap and a small scleral flap. The iridectomy is peripheral. The sutures of virgin silk, tinted with methylene blue for better visibility, are threaded on 4-mm. long Grieshaber needles and held by a specially designed needle holder. A suture is inserted through the small scleral tongue under the conjunctival flap and the scleral lip of the incision; this suture remains buried. In cases without a small scleral tongue for the insertion of the suture, an intracorneal suture is inserted. One needle of a double-armed suture is inserted into the cut surface of the cornea to one side of the 12-o'clock meridian and brought out through the cut surface on the other side of the 12-o'clock meridian; the two needles are then passed through the scleral lip of the wound to be tied on the scleral surface. This suture is also buried. A large opening in the anterior lens capsule is made with the point of a

knife, avoiding the traction incident to capsule forceps. The lens is delivered by pressure and massage, and thorough irrigation of the anterior chamber. The Ridley lens is inserted with a specially designed suction cup, which eliminates trauma to the iris incident to manipulation with forceps. The suction on the lens is released and the suture closed. The lens is centered by pressure over the cornea with a spoon or hook. Two additional buried corneoscleral subconjunctival sutures are inserted. The conjunctival wound is sealed with plasmothrombin, 10 mg. of cortone is injected subconjunctivally, and a bandage is applied. (17 figures) Ray K. Daily.

Guillaumat, L., and Tapie, R. **Operative treatment of complicated cataracts. (Iridocyclitis.)** Arch. d'opht. **14**:447-469, 1954.

The authors note that in spite of ACTH and cortisone, iridocyclitis remains an important cause of cataract. They discuss the operative indications for complicated cataract and point out the risk of surgery during the activity of an iridocyclitis. They recommend the aqueous puncture test of Amsler, Bohringer, and Verrey, and the fluorescein-capillary-permeability test, as valuable indicators of activity. They consider that operation is indicated, however, in those cases in which inactivity of the uveitis cannot be attained within a reasonable period of time. They urge special preoperative examination and treatment, particularly with cortisone systemically and topically, followed, especially in severe cases, by a preliminary full iridectomy; at this time synechiae can be ruptured. One or two inferior iridotomies are useful in facilitating removal of the lens by the erisophake and to avoid hammock pupil. They advocate intracapsular extraction. Statements as to prognosis, they feel, must be extremely guarded, the visual results averaging from 0.2 to 0.3. (1 table, 54 references) Phillips Thygeson.

Krwawicz, Tadeusz. **Continuous corneo-scleral suture in the operation of a complicated cataract and a dislocated lens.** Klinika Oczna **24**:121-126, 1954.

The author briefly discusses the importance of suturing the incision in cataract surgery and describes his own suture, which he considers superior, in the extraction of a dislocated lens. It is a continuous suture inserted in the 3-, 12- and 9-o'clock positions through the sclera and the half thickness of the cornea. (9 figures, 10 references) Sylvan Brandon.

Marty, F. **Anterior internuclear uncinate cataract.** Ophthalmologica **127**:331-332, April-May, 1954. (1 figure, 1 reference).

This extremely rare form of congenital or early acquired cataract looks like the outline of a rose-window or a deeply notched disc located between the peripheral embryonic and adult nucleus in the anterior layers of the lens and does not interfere with vision. (1 figure, 1 reference) Peter C. Kronfeld.

Médinger, F. **Evolution of our conception of the incision in the operation of cataract extraction based on 5,000 interventions. The angular incision.** Arch. d'opht. **14**:380-386, 1954.

Médinger discusses his experiences with the incision in over 5,000 cataract extractions during the past 25 years and concludes that a corneal incision is most apt to avoid the postoperative complications of iris prolapse and anterior chamber hemorrhage. He advocates an angular incision to facilitate the introduction of sutures and to diminish postoperative astigmatism, which with this technique varies from 0.0 to 1.5 diopters. The angular incision from 11 to 1 o'clock facilitates exact apposition of the wound edges. (3 figures) Phillips Thygeson.

Roig, Alberto. **A double suture for cataract extraction.** Arch. Soc. oftal. hispano-am. **14**:886-889, Aug., 1954.

The corneo-sclero-conjunctival suture, the subject of this article, is inserted with a Grieshaber needle. The needle is inserted through the cornea, ½ mm. from its union with the conjunctiva. It emerges through the middle of the cut corneal surface, and is inserted into the middle of the cut scleral surface, emerging on the scleral surface; it then perforates the conjunctival flap and emerges ½ mm. from the corneoconjunctival union. The technique of the operation is as follows. A large conjunctival flap is dissected over the upper half of the eyeball and inverted over the cornea. The keratotomy is made with a knife and enlarged with scissors. The suture is inserted in the 12-o'clock position. Peripheral iridectomy is followed by lens extraction with Arruga forceps or erisophake; the suture is tied and two additional sutures to the sides of the central suture are inserted. The iris is replaced; if the globe is hypotonic, air is injected into the anterior chamber. The conjunctival flap is closed by a continuous suture. (2 figures) Ray K. Daily.

11

RETINA AND VITREOUS

Bailliart, P. **The ocular fundus in arterial hypertension.** Ann. d'ocul. **187**:647-650, July, 1954.

A consideration of morphologic changes is not enough in the evaluation of the fundus in arterial hypertension. The retinal arterial pressure should also be measured. From this can be calculated what the author calls the "retinohumoral index," which has considerable prognostic value. John C. Locke.

Brand, I., Kadas, L., and Arato, I. **General pathology of angioid streaks.** Klin. Monatsbl. f. Augenh. **125**:400-408, 1954.

A 45-year-old man with bilateral angioid streaks, retinal hemorrhages and scars also had a pseudoxanthoma elasticum, which could be histologically verified. Capillary fragility was increased and this is interpreted as a generalized damage to the elastic fibers of the vessels. (4 figures, 1 colored plate, 38 references) Frederick C. Blodi.

François, J., and Decock, G. **Tapetoretinal degeneration of delayed onset.** Ann. d'ocul. **187**:651-657, July, 1954.

The authors report two cases of tapetoretinal degeneration with onset at 62 and 65 years of age. Pigmentary deposits were absent in both cases, the tapetoretinal degeneration consisting of a simple retinal atrophy and choroidal sclerosis. However, the appearance of the optic discs and retinal vessels, the visual field changes, the adaptation curves, and the electroretinographic and electroencephalographic findings were exactly like those in cases of retinitis pigmentosa. Evolution of the changes was rapid in both cases, the visual fields undergoing constriction to 5 and 10 degrees within three years. Family histories were negative. (8 figures) John C. Locke.

Funder, W. **Rare fundus changes in Wilson's disease.** Klin. Monatsbl. f. Augenh. **125**:472-474, 1954.

The right eye of an 11-year-old boy showed a typical Kayser-Fleischer ring and a peculiar pattern of the posterior fundus, not unlike a choroidal sclerosis. The left eye showed a hypermature cataract. After extraction a retinal detachment became visible. (11 references) Frederick C. Blodi.

De Gennaro, Giuseppe. **The macular lesions of solar eclipse.** Rassegna ital. d'ottal. **23**:315-332, July-Aug., 1954.

The lesion typical of exposure to the solar eclipse is a disturbance of the macu-

la from overstimulation. The severity depends upon the length of the exposure and is followed by a small zone of depressed central vision. In very mild cases recovery is complete but no treatment is effective in the more marked cases. The author reports eight cases in none of which a traumatic hole at the macula, which has been reported by some writers, was observed. He recommends study of the fundus with red-free light. (16 references) Eugene M. Blake.

Henry, Margaret. **Recent advances in retrolental fibroplasia.** California Med. **81**:272-275, Oct., 1954.

A concise classification and history of retrolental fibroplasia is given. Oxygen should be ordered in terms of concentration and not over 40 percent rather than liter flow rate. Withdrawal of premature infants from oxygen to normal air should be a gradual process. (2 tables, 34 references) Irwin E. Gaynon.

Järvinen, P. A., and Kinnunen, O. **Retinal detachment as a complication in toxemia of pregnancy.** Gynaecologia **138**: 405-409, Sept., 1954.

Two cases of bullous retinal detachment, one unilateral and the other bilateral, following eclamptic convulsions due to severe toxemia of a nephritic type are described. Both women gave birth to stillborn premature infants. Vision was recovered after a few days without specific treatment. (12 references) Irwin E. Gaynon.

Klemanska, Krystyna. **Scleral staphyloma and retinal detachment.** Klinika Oczna **24**:143-145, 1954.

In a carpenter, 53 years of age, who had loss of vision in one eye for one week, detachment of the retina in the upper temporal quadrant was found. There was a large horseshoe-shaped hole at the equator. During the operation a staphyloma at the insertion of the superior oblique muscle tendon was found. The sclera at that point was very thin and almost transparent. After diathermy micropuncture the subretinal fluid escaped and the staphyloma disappeared. The result of the operation was satisfactory. Vision after discharge from the hospital was 6/18. (5 references) Syvan Brandon.

Krawczyk, Z., and Szosland, M. **A case of Oguchi disease.** Klinika Oczna **24**:139-141, 1954.

Apparently congenital hemeralopia with no other symptoms in a woman, 29 years of age, is described. The eyegrounds were pinkish-gray with scattered granulation and normal discs and blood vessels. The color of the eyeground would become almost normal after a time in darkness. The discoloration of the retina is caused not by the lack of degeneration of the visual purple but by the interposition of a layer of cells containing grains of fuscin between the retinal pigment and the other layers of the retina. (2 figures, 9 references) Sylvan Brandon.

Kyrieleis, W. **The eyeground in the toxemias of pregnancy.** Geburtsh. u. Frauenh. **14**:869-879, Oct., 1954.

Kyrieleis points out that the ophthalmoscopic pictures of hypertensive retinopathy and the retinopathy of toxemia of pregnancy are similar. They differ in tempo of development (months and years for the former; hours and days for the latter). The cause of the former is unknown. The development of the latter depends on the presence of a fetus.

In severer toxemia there are not only vascular changes, but changes in the retinal parenchyma—increased fluid, hemorrhage, and white spots. The increased fluid content manifests itself in an increased turgescence which the French have aptly named oedème pailetté. The external and internal limit-

ing membranes are tied together by Mueller's supporting fibers which sets definite limits to the edema. As the space between the limiting membrane becomes tensely filled, the areas of attachment of Mueller's fibers become the site of tiny depressions which give rise to tiny round or punctate reflexes which change with the movement of the ophthalmoscopic light. The fundamental disturbance which underlies the changes in the retina in toxemia of pregnancy is in the functional change in the vascular system. The severest eclamptic retinopathy is completely remediable if its cause can be removed. Once toxemia of pregnancy has been recognized, repeated ophthalmoscopy is indicated.

The suddent increase of the incidence of vascular changes and retinopathy from 45 percent in slight toxemias to 85 percent in serious ones shows clearly the value of the fundus picture as an index of the severity of the toxemia. In general there is fair correspondence between fundus and toxemia, but the correspondence is not absolute nor would one expect it since the retinal signs are not the disease itself but its manifestations. In the series of Mittelstrass and Wolfhagen retinal signs were absent in 15 percent of severe toxemias and, on the other hand, 6 percent of women with only slight clinical manifestations had not only vascular signs but retinopathy. One can, however, be certain that increase in severity of retinal vascular changes and the development of parenchymatous changes indicates threatened exacerbation of the other symptoms. In this sense the ophthalmoscopic findings help in deciding on therapeutic action. (3 figures, 7 references)

F. H. Haessler.

Lisiecka-Adamska, H., and Miratynska-Rusinowa, E. **Angiectases in diabetics.** Klinika Oczna **24**:105-112, 1954.

195 patients among 667 diabetics had angiectases. In 102 of them there were other diabetic retinal changes. There was no relation between the severity or duration of diabetes and the frequency of angiectases; they were found more frequently in nontreated or irregularly treated patients and also in younger people. High blood pressure was not considered a contributing factor. A large percentage of patients had symptoms of disfunction of the pancreas. Fatty degeneration of the vascular walls may contribute to formation of vascular distentions and is caused by the deficiency of pancreatic secretion of a lipocaic hormone. (6 tables, 15 references)

Sylvan Brandon.

Matteucci, Pellegrino. **The clinical and therapeutic problem of myiodesopsia in the young.** Rassegna ital. d'ottal. **23**:267-271, July-Aug., 1954.

The intensive clinical study of the symptom of myiodesopsia (muscae volitantes) in young nonmyopic individuals demonstrates, more frequently than suspected, signs of inflammation of the uveal tract. The writer suggests that a thorough clinical, laboratory, and biomicroscopic study be made. A slight modification of the aqueous and anterior vitreous may reveal the existence of posterior detachment of the vitreous. The use of the Goldman contact or the Hruby lens is recommended. (2 figures, 7 references)

Eugene M. Blake.

Rintelen, F. **The prognosis in retinoblastoma.** Ophthalmologica **127**:253-254, April-May, 1954.

In cases of retinoblastoma the problem of prognosis is twofold: 1. the probability of survival of the affected individual, and 2. the probability of the occurrence of retinoblastoma in the offspring of affected, but cured individuals. With regard to point one the author finds the histologic character of the growth of no

prognostic significance. Invasion of the optic nerve discovered after enucleation is not necessarily a bad prognostic sign since radiotherapy is usually very effective in such cases.

Definite information concerning point two can only be obtained through a thorough search of the patient's ascendants. In the current literature the stress seems to be on the familial form of retinoblastoma. The cases seen in the author's clinic (Basle, Switzerland) were without exception of the sporadic, non-familial type. Peter C. Kronfeld.

Straub, W., and Goldeck, H. **An unusual cause for fundus hemorrhages.** Klin. Monatsbl. f. Augenh. **125**:408-413, 1954.

Retinal hemorrhages, one of them unusually dark, were observed in two pregnant women. The patients were otherwise completely normal, except for an iron-deficiency anemia. The administration of iron cured the anemia and the hemorrhages became absorbed quickly. (1 figure, 2 tables, 1 colored plate, 17 references) Frederick C. Blodi.

12

OPTIC NERVE AND CHIASM

Chinaglia, Vincenzo. **Primary meningioma of the optic nerve sheath.** Rassegna ital. d'ottal. **23**:284-314, July-Aug., 1954.

The author describes a primary tumor of the sheath of the optic nerve occurring in a 45-year-old woman. It was histologically diagnosed as an alveolar meningioma. The patient had an exophthalmos of moderate degree, the displacement was directly forward and non-compressible. The fundus showed a moderate degree of peripapillary edema but vision was little affected. X-ray films demonstrated a mass at the orbital apex with no sign of bony change. An extended review of the literature is given, particularly as to the histogenic origin of this particular tumor, which is mesenchymal. (10 figures, 77 references) Eugene M. Blake.

13

NEURO-OPHTHALMOLOGY

Orlowski, Witold J. **Bilateral nasal hemianopsia.** Klinika Oczna **24**:153-159, 1954.

The first symptoms appeared five years before examination. The vision was 6/50 in each eye. Argyll Robertson pupils, bilateral optic atrophy, and bilateral hemianopic loss of visual field with large paracentral scotoma were found. Neurosurgical exploration revealed meningeal adhesions surrounding the chiasm which were removed surgically. There was temporary improvement of visual fields but no improvement in visual acuity. The author discusses the literature, describing 186 cases of binasal hemianopsia due to optochiasmatic arachnoiditis, of which 58 were confirmed anatomically. The author feels that it is not only the pressure on the optic nerves that produces loss of visual fields but that there is also a pathologic process affecting the nerve tissue. (4 figures, 18 references) Sylvan Brandon.

Perris, F., and Perris, C. **Hysteric amaurosis and amblyopia. Report of four cases.** Boll. d'ocul. **33**:713-720, Oct., 1954.

The patients ranged between 11 and 21 years, and were extensively studied to exclude organic disease. Both sexes were represented. Treatment consisted of administration of vitamin B_1, acetylcholine, and mild barbiturates. The psychologic point of view was not neglected. (30 references) K. W. Ascher.

Salvi, G. L. **An interesting case of optic neuromyelitis.** Boll. d'ocul. **33**:661-674, Oct., 1954.

A 58-year-old man developed bilateral

amaurosis followed by optic atrophy, and gradual resolution into an absolute central scotoma of his right visual field and a relative one on the left side. Two weeks after the onset of the visual symptoms, heat and pain perception in his lower extremities were affected, more on the left side, while motility was lost on the right. After a transient improvement, a recurrence was characterized by sphincter paralysis, paraplegia, loss of heat and pain perception, increased tendon reflexes, positive Babinsky and Oppenheim. Visual acuity and fields recovered gradually in both eyes, mainly in the right. Hypoesthesia for heat and weakness of the right side remained in the lower extremities. Large amounts of antibiotics were administered and, in the author's opinion, probably saved the life of the patient. However, during the administration of chloramphenicol, both ocular and general signs and symptoms became definitely worse. (45 references) K. W. Ascher.

14

EYEBALL, ORBIT, SINUSES

Babel, J. **Xanthomatous tumor of the orbit.** Arch. d'opht. **14**:489-495, 1954.

The author reports the case of a child of 13 years with a progressive left exophthalmos that necessitated exenteration of the orbit. The tumor was diagnosed as a xanthosarcoma but the benign clinical course after incomplete removal called for re-evaluation. The tumor was characterized microscopically by richness in cells, cellular polymorphism and infiltrative properties. These features suggested a reticular sarcoma. The author suggests that the tumor was probably a type of reticulo-endothelioma, possibly a monosymptomatic form of Hand-Schüller-Christian disease. A review of the literature on the ocular manifestations of this disease is included. (4 figures, 17 references) Phillips Thygeson.

Bernoulli, René. **Pseudotumor of the orbit.** Ophthalmologica **127**:279-282, April-May, 1954.

The report concerns a case of gradually increasing proptosis, ptosis and swelling of the upper lid of the left eye in a 58-year-old, otherwise healthy woman. A circumscribed growth could be palpated through the lid. The pre-auricular gland was slightly swollen and indurated. Thus all findings pointed toward a true neoplasm. It was removed by simple orbitotomy and proved to be an inflammatory pseudotumor. The possibility of a pseudotumor should always be kept in mind, particularly before any major, mutilating surgery is undertaken. (2 figures, 3 references) Peter C. Kronfeld.

Bonnet, Paul. **Osteomyelitis of the superior maxilla in the newborn.** Arch. d'opht. **14**:343-351, 1954.

The author has observed 15 infants with osteomyelitis of the superior maxilla over a period of 20 years and notes that the condition is almost exclusively a disease of the first year of life, although he has seen one case in a child of four years. He believes that this condition is more common than generally realized and that in some infants dying of septicemia, the primary focus in the maxilla has been overlooked. Most of the cases are seen initially by ophthalmologists but an important number are seen first by rhinologists, pediatricians, and general physicians.

Bonnet stresses that the condition is not a maxillary sinusitis and that at birth this sinus does not exist, the maxilla being a spongy bone in a constant state of hyperemia. He believes that the infection arises variously, in part from the umbilicus, in part from a local infection of the dental follicle, but more often from a transient bacteremia of intestinal origin. The first sign of the disease is a one-sided facial swelling, with signs of an orbital

cellulitis that is actually an extraperiosteal suppuration of the orbit. In unfavorable cases the superior maxilla is transformed into a purulent sponge. The prognosis has become less grave since antibiotic and sulfonamide therapy has been available, but death from bronchopneumonia, endocarditis, and meningitis still occasionally occurs. Recovered infants rarely show changes in the globe but faulty development of the orbit and teeth is to be expected. (1 figure)

Phillips Thygeson.

Offenbach, Bertha. **Dislocation (luxation) of eyeball.** New England. J. M. **251**:338-339, August 26, 1954.

A case of luxation of the eyeball due to adiposis within the orbit is reported. The bony structure is normal. Reduction is accomplished by pressure on the sclera, warm compresses, canthotomy, or anaesthesia such as trichlorethylene. (1 figure, 11 references) Irwin E. Gaynon.

Offret, G., Gilles, E., and Blanchot, F. **The role of orbital tomography with injection of air in ophthalmology. Part II.** Arch. d'opht. **14**:352-379, 1954.

In the second part of this study on orbital tomography the authors describe their results in the study of orbital pathology in 13 patients with orbital disease. They conclude that injection of air into the orbit allows X-ray visualization of orbital neoplasms and that frontal and profile tomography permits the exact localization of the tumor revealed by the air injection. They note further that tomography permits an estimation of the probable size of the neoplasm and its relation to the globe, to the orbital walls, and to other intraorbital structures. The value of this localization as a guide to proper surgical approach is stressed. They advocate general use of this method since it carries no danger of complications, since errors of interpretation are infrequent, and since further studies should lead to refinements in technique and interpretation. (27 figures, 13 references)

Phillips Thygeson.

15

EYELIDS, LACRIMAL APPARATUS

Birkner, R., and Trautmann, J. **Radiation therapy for epitheliomas of the lid.** Klin. Monatsbl. f. Augenh. **125**:445-457, 1954.

The authors, who are radiologists, prefer contact irradiation with soft (60 KV) X-rays for treatment of malignant tumors of the lids. The individual dosage varies between 200 and 400 r, the total dosage between 4000 and 6000 r if the lesion is infiltrating. Eighty-five patients were treated and in 60 the treatment was completed when the report was written. Fifty-three patients could be followed; of these 36 were healed after one series, while eight needed a second and six a third series. Three patients died from metastases. No untoward after-effects were observed. (13 figures, 21 references)

Frederick C. Blodi.

Gaulhofer, W. K. **The effect of cortisone on Sjögren's syndrome.** Acta Med. Scandinav. **149**:441-448, Aug. 17, 1954.

Six cases were studied. The cases in which there was very slight impairment showed some improvement after cortisone therapy. Where the secretions were greatly decreased, there was no improvement. Cortisone is not to be recommended for the treatment of Sjögren's syndrome. (5 figures, 14 references)

Irwin E. Gaynon.

Gerkowicz, Kazimierz. **Modification of a trephine for the dacryocystorhinostomy.** Klinika Oczna **24**:149-151, 1954.

The author describes a modification of a bone trephine used for dacryocystorhinostomy, which was made to prevent injury to the nasal mucosa after passing

through the bone. A collar covers the cutting crown of the trephine from the outside. (3 figures, 3 references)

Sylvan Brandon.

Sánchez Pedreño Martínez, José. **Treatment of dermatitis of the lids.** Arch. Soc. oftal. hispano-am. **14**:932-968, Aug., 1954.

This monograph is a prize essay which covers in detail the various affections of the lids. They are classified in two large divisions; those of known and those of undetermined etiology. Those of known etiology are subdivided into burns, radiodermatitis, parasitic infections, virus diseases, microbian infections, xanthelasma, epitheliomas, carbuncles, syphilis, and protozoan diseases. Those in the subdivision of undetermined etiology are eczema, angioneurotic edema, lichen planus, and neoplasms, such as milium, papillomas, keloids, xanthelasma, senile keratosis, epithelioma, naevocarcinoma, sarcoma and angioma. The detailed description of the therapy of each condition is based on a review of the literature as well as on the author's own material. (6 figures)

Ray K. Daily.

16

TUMORS

Kapuscinski, Witold J. **Angiomas of the lids and the orbit.** Klinika Oczna **24**:99-104, 1954.

The clinical aspect and microscopic examination in five cases of palpebral angiomas in little children are reported. Despite endothelial proliferation, no evidence of malignant degeneration was found. An additional case in a 34-year-old woman is described, an orbital angioma which started in childhood. Despite surgery it continued to increase until the eye was totally lost. After partial exenteration of the orbit the tumor was removed. Microscopic examination revealed the presence of fibrous organized thrombi but no evidence of malignancy. (12 figures)

Sylvan Brandon.

Miescher, G. **Radiation therapy of lid tumors.** Ophthalmologica **127**:197-216, April-May, 1954.

Miescher, director of the dermatologic clinic of the University of Zürich, gave this report before the annual meeting of the Swiss Ophthalmological Society in October, 1953. The report was based on 201 basal-cell carcinomas, 46 squamous-cell carcinomas, 6 melanomas and 1 sarcoma. Almost all patients were treated with X-rays, a good many by contact radiation. If the field was small (less than 3 cm. in diameter) the full dose (2000 to 2200 r) was usually given in one sitting. In the case of larger fields doses of 400 to 450 r were given two to three times weekly until a total dose of 4000-4500 r was reached. The globes were carefully protected with lead or gold contact shells. A cataract developed only in one patient in whom the size of the tumor made the insertion of the lead shell impossible. 180 patients with basal-cell carcinoma could be followed after the radiation; 151 of them became and remained symptom-free after the first course of radiation; in 23 cases the tumor recurred after the first course but responded to a second course of radiation; in six cases radiation therapy failed to bring the tumor under control. Five of these six cases were of the bone-invading type which generally responded poorly to radiation and should therefore be attacked by the most radical type of surgery, without any consideration for function or appearance.

Surgical treatment was preferred to radiation in cases of destruction of a major portion of the lid which would have required plastic repair even in case of a cure by radiation therapy.

With regard to surgery as a secondary procedure (following radiation) the author found the usual doses of radiation

to have no significant effect upon the operation itself or upon the healing process. Only repeated unsuccessful courses of radiation made the chances for secondary surgery worse.

The squamous-cell carcinomas and melanomas responded to radiation therapy almost as well as basal-cell carcinomas. Radiation therapy should not be considered the method of choice for the treatment of lid tumors since many of these tumors can be treated equally well by either radiation or surgery. Radiation should, however, be the method of choice in those cases in which the location, character and extent of the tumor make radical surgery difficult. Radiation is of decided superiority in the treatment of precancerous lesions of the lids including precancerous melanosis. Of the benign lid tumors the true tuberous angiomas, that is, the tumor-like angiomas, respond ideally to radiation, in contradistinction to the teleangiectatic nevi which are practically refractory. (6 figures, 7 references)

Peter C. Kronfeld.

Perez-Villegas, Eduardo. **Chloroma.** Arch. chil. de oftal. **11**:46-48, Jan.-June, 1954.

The author gives briefly the history of a patient with a progressive exophthalmos which became bilateral. He also had a myeloblastic leukemia. With these two signs alone the author believes a chloroma can be diagnosed. No pathologic study is included. (2 figures, 4 references)

Walter Mayer.

Safar, K. **Electrosurgery of malignant ocular tumors.** Ophthalmologica **127**:217-219, April-May, 1954.

The author's method of choice for the treatment of lid and epibulbar tumors is the radical excision of the tumor by means of a cutting electric current, followed by electrocoagulation of the base and plastic repair. Radiation therapy is advocated only in early or very late, inoperable cases or if the patient refuses surgery.

Peter C. Kronfeld.

Werner, H. **The therapy of malignant lid tumors.** Ophthalmologica **127**:219-225, April-May, 1954.

A small series of malignant lid tumors demonstrates that a good many of them can be treated effectively with either surgery or radiation. In carcinomas of the inner canthus radical surgery is preferable to radiation. (7 figures, 8 references)

Peter C. Kronfeld.

17

INJURIES

Marchessi Vallejo, Fernando. **Intraocular foreign bodies.** Arch. Soc. oftal. hispano-am. **14**:660-671, June, 1954.

This is a report of a case with legal complications. The patient, who was an electrician, was injured in the right eye while at work, and a foreign body was removed from the cornea. An intralenticular foreign body in the left eye, and penetrating injury of the cornea and the iris escaped notice completely, until three months later, when the opacification of the lens led the injured man to seek an ophthalmologic examination. Conventional roentgenography failed to demonstrate the foreign body, but it was visible with bone-free roentgenography. The lens was extracted with the intraocular foreign body. The injury to the left eye not having been reported when it happened, the patient's right to compensation became a legal question. (4 figures) Ray K. Daily.

Pallares, J. **Toleration of an intraocular bird-shot, and significant late recovery of vision.** Arch. Soc. oftal. hispano-am. **14**: 647-659, June, 1954.

This case report is used by the author to make a plea against the prompt enucleation of injured eyeballs, for fear of sympathetic ophthalmia. In this case the shot

penetrated the eyeball through the nasal limbus, and was localized roentgenographically with the aid of a metal ring around the cornea, in the internal inferior portion of the vitreous, behind the lens. Six months later vision, which at first was limited to counting of fingers at one meter, reached 0.15. In addition to the dense cicatrix in the inferior periphery of the fundus, macular lesions caused by the contusion were the cause of the low central visual acuity. The visual field was restricted in the superior sector. (7 figures) Ray K. Daily.

18

SYSTEMIC DISEASE AND PARASITES

Ditzel, J., White, P., and Duckers, J. **Changes in the pattern of the smaller blood vessels in the bulbar conjunctiva in children of diabetic mothers.** Diabetes 3: 99-106, March-April, 1954.

A preliminary study of the smaller blood vessels and their hemodynamics in the bulbar conjunctiva of diabetics indicated that even with very short duration of the disease, evidence of capillary changes was present. Since also some subjects with diabetes in their immediate family were found to have similar changes, an investigation was made of the vascular pattern in healthy children of diabetic mothers.

The results of this study showed that many of these children had more marked and different changes in the vascular bed than did the control group of healthy children of nondiabetic parents. The changes in the children of diabetic mothers appeared similar to those of young diabetics. This was of particular interest when it was found in the overall study of these children that they also showed a high incidence of diabetes as shown by glucose tolerance test. In addition, these children showed abnormal growth and development as well as elevated 17-ketosteroid excretion. There was found a positive correlation between the degree of vascular changes in the smaller blood vessels and an abnormal tolerance test as well as to growth peculiarities according to Wetzel's grid. It is suggested that the precipitating factor of these abnormalities is the same and that possibly it may be of pituitary origin. (3 figures, 3 tables, 22 references)

Author's summary.

Donoso, F., Jadresic, A., Sans, R., and Lopez, E. **Ocular signs in thyroid diseases.** Arch. chil. de oftal. 11:5-12, Jan.-June, 1954.

The authors consider exophthalmos, retraction of the upper lid, palpebral edema, and chemosis as important signs. Graefe's sign is the most important one and is frequently unilateral. They consider two types of exopthalmos: one type which has all other symptoms of Graves' disease, and recedes with the medical or surgical treatment of this disease, and the second type, which has a progressive tendency. The disparity between the exophthalmos and the basal metabolism is very important for the diagnosis of malignant exophthalmos. In experimental cases, extracts of the anterior lobule of the hypophysis produce exophthalmos.

Normally the hypophysis secretes thyrotropic hormone which stimulates the thyroid to secrete, and this secretion not only works peripherally, but also works on the hypophysis, depressing its thyrotropic secretion. In Graves' disease, exophthalmos probably arises because this equilibrium is destroyed. The presence of a malignant exophthalmos after thyroidectomy can be ascribed to the lack of inhibition on the hypophysis by the thyroid hormone. Recently it has been claimed that a special exophthalmos-producing substance has been isolated.

Benign exophthalmos should be treated with the other symptoms of Graves' disease. If a diagnosis of malignant exoph-

thalmos has been made, care should be taken to avoid any measure which depresses the thyroid. Estrogens and thyroid extracts should be administered to control the activity of the hypophysis. Irradiation of the hypophysis should be considered, and if all this fails, a tarsorrhaphy and Nafziger's orbital decompression should be considered. (1 figure, 2 tables, 12 references) Walter Mayer.

Goodman, Joseph E. **Vascular lesions in diabetes mellitus.** A.M.A. Arch. Ophth. **52**:108-120, July, 1954.

The author believes that diabetic retinopathy is independent of atherosclerosis, closely related to the control of diabetes and is probably the result of hormonal imbalance. He further believes that diabetic retinopathy is reversible. Patients with Kimmelstiel-Wilson disease have closely related retinal and kidney lesions. (51 references) G. S. Tyner.

Griepentrog, Fritz. **Histologic examination of temporal arteritis.** Klin. Monatsbl. f. Augenh. **125**:413-419, 1954.

On the basis of two cases in which the vessels were examined histologically, the characteristic features of temporal arteritis are discussed. These are a granulomatous infiltration of the media, the frequent occurrence of foreign body giant cells and the destruction of the internal elastic lamella. Temporal arteritis can be differentiated from periarteritis nodosa, which affects predominantly the adventitia, and from thrombangitis obliterans, a disease of the intima. (2 figures, 16 references) Frederick C. Blodi.

Hambresin, M. L. **Quincke's edema and the eye.** Bull. Soc. belge d'ophtal. **106**:148-155, March, 1954.

Quincke's edema is manifest as single or multiple localized swelling without kidney or heart disease. It starts suddenly but often is preceded by headaches and malaise. It is an allergic manifestation and may occur with migraine, urticaria and asthma. Skin and mucous membranes are especially affected when exposed to certain substances which cause the lesions to recur. Isolated ocular lesions are more difficult to diagnose.

Auto-hemotherapy, a mild form of protein therapy, is suggested as the treatment of choice; 10 cc. of the patient's own blood is injected intra-gluteally every second day. At least 10 injections are necessary. Sometimes improvement is only visible after 15 to 20 injections. An autoclaved syringe should be used, as dryness of the syringe is essential. Cortisone was used in one patient without any success. (1 figure) Alice R. Deutsch.

Hartmann, Karl. **Ophthalmomyiasis.** Klin. Monatsbl. f. Augenh. **125**:227-230, 1954.

These are remarks on a similar paper by Kiel (Klin. Monatsbl. f. Augenh. 124:194-200, 1954). Hartmann believes that the larvae reach the anterior chamber directly through the sclera. This form of internal ophthalmomyiasis has a better prognosis than the condition in which larvae are found in the vitreous. They reach the vitreous either directly through the sclera or from the anterior chamber. In contrast to Kiel, Hartmann does not believe that the larvae in the anterior chamber get there from the vitreous. (7 references) Frederick C. Blodi.

Laje Weskamp, R., and Segura, A. **Ocular lesions in periarteritis nodosa.** Arch. oftal. Buenos Aires **29**:141-154, March, 1954.

Periarteritis nodosa, a condition now ranged among adaptation diseases, may lead to severe ophthalmic disorders, which occur in about 10 percent of all cases. Papilledema, atrophy of the optic nerve,

hypertensive retinitis, extensive secondary retinal detachment, choroiditis, iritis, secondary glaucoma, occlusion of the central retinal artery (which is eventually associated with bilateral temporal arteritis), episcleritis, scleromalacia and even disturbances of the extraocular muscles have been described. Marked by symptoms of systemic infection and, more often than not, by a rapidly progressive loss of renal function, the disease consists of inflammatory changes of the coats of the small and medium-sized arteries throughout the body. Biopsies from muscular nodules or the skin are of prime importance in establishing the diagnosis, which is usually very difficult from a clinical standpoint and has to be made with respect to lupus erythematosus, endocarditis lenta and diverse septicemic conditions in particular.

The case of a 34-year-old man is presented, in whom periarteritis nodosa assumed a predominantly cutaneous form and ended fatally after a course of 10 months. During the late stages an incomplete picture of arteriospastic retinitis was seen, as was also a profuse hemorrhage of the anterior chamber. Histologic study of a skin fragment made diagnosis possible. (5 figures, 14 references)

A. Urrets-Zavalia, Jr.

Musial, Albin. **A case of a human eye attacked by a leech.** Klinika Oczna **24**:147-148, 1954.

A young man, 18 years of age, felt sudden pain in the right eye while on an outing. When seen by a first aid man, prolapse of the ciliary body was diagnosed. When examined by the author a leech was found under the upper lid. It was 10 mm. long and 5 mm. wide, looking like a prolapsed piece of choroid. The leech was classified as Theromyson tesselatum which attacks birds, particularly ducks, and lives in ponds. (1 figure, 2 references)

Sylvan Brandon.

Pietruschka, Georg. **Ocular changes in Paget's disease.** Klin. Monatsbl. f. Augenh. **125**:171-183, 1954.

An 83-year-old woman had generalized Paget's disease and a bilateral disciform degeneration of the macula. This combination has been observed before and so has the occurrence of angioid streaks, circinate retinopathy and pseudoglaucoma in Paget's disease. The author examined 24 patients with cranial involvement and 35 without cranial involvement in Paget's disease. None of the above mentioned ocular conditions were found. On the other hand, skull X-rays of nine patients with angioid streaks, 15 patients with disciform macular degeneration, seven with circinate retinopathy, 35 patients with senile macular degeneration, and 14 with pseudoglaucoma did not reveal any signs of Paget's disease. One hundred patients with sclerosis of the internal carotid artery showed a high incidence of the above mentioned ocular conditions. These are therefore probably caused by the atherosclerosis which usually accompanies Paget's disease. (2 figures, 3 tables, 76 references)

Frederick C. Blodi.

Segal, Pawel. **Ocular changes in collagen diseases.** Klinika Oczna **24**:113-120, 1954.

The physiology of the connective tissue and the histopathologic changes occurring in it during the collagen diseases are described by the author. He describes disturbances in the eye during such collagen diseases as rheumatoid arthritis, erythema multiforme and erythema nodosum. He describes scleromalacia perforans, erythematodes generalisatus, periarteritis nodosa, sclerodermia and dermatomyositis in detail and discusses the theory of collagen diseases. (32 references)

Sylvan Brandon.

19

CONGENITAL DEFORMITIES, HEREDITY

Badtke, G. **Congenital retinal folds of the embryonic retina.** Arch. f. Ophth. **155**: 266-283, 1954.

The eyes of three fetuses, four to five months old, were studied macroscopically and microscopically. Retinal folds were found in the lower temporal segments of the bulbi. The changes seem to be related to what has been described as ablatio falciformis congenita. They are considered to be true malformations. An additional case of an atypical falciform ablatio in an adult supports the view that this condition also presents a developmental anomaly. Ablatio falciformis congenita was first described by Weve (Brit. Journ. Ophth. 22, 1938). (9 figures, 21 references)

Ernst Schmerl.

Cadenas Ugidos, C. **Congenital aniridia.** Arch. Soc. oftal. hispano-am. **14**:923-931, Aug., 1954.

The literature on congenital ocular anomalies, with special reference to their etiology is reviewed and a case is reported. The three-month-old infant had multiple congenital anomalies, comprising bilateral aniridia, absence of the maculas, nystagmus, umbilical hernia, and an area of abnormal pigmentation. There was no family history of congenital anomalies, of consanguinity of the parents, or venereal disease. The pregnancy was complicated by hemorrhages due to placenta previa, and maternal anemia which became acute during the second month of pregnancy. It is pointed out that the abdominal walls do not close until the third month of intrauterine development and the umbilical hernia could be accounted for by interference with development which took place at the same embryonic period, in which the disturbance accounting for the ocular anomalies occurred. The disturbance in pigmentation is attributed to a dysfunction in the hypothalamic and pituitary regions. (26 references) Ray K. Daily.

Casio, Giuseppe. **The clinical association of keratoconus and cataract.** Rassegna ital. d'ottal. **23**:333-338, July-Aug., 1954.

Two cases of keratoconus and cataract in the same patient are reported. In each instance the two lesions were congenital. The writer considers that these two defects are not due to some altered function of specific organs of undetermined origin, but rather to the disturbance of a common cerebral segment from which different ocular lesions are derived. (4 references) Eugene M. Blake.

Macdonald, A. M., and Dawson, E. K. **Simple congenital microphthalmia. The record of a bilateral example.** Edinburgh M. J. **61**:297-304, Sept., 1954.

The authors present a case of bilateral simple congenital microophthalmia in an infant, two days of age, who died because of other congenital anomalies. The globes were scarcely 1 cm. in diameter, which is near the lower limit of size in reported cases of microphthalmos. This is a very rare anomaly. (22 figures)

Irwin E. Gaynon.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Davis, C. J., and Jobe, F. W. **The importance of the A.C.A. ratio in industrial and school success.** Am. J. Optometry **31**: 521-532, Oct., 1954.

The A.C.A. ratio provides a stable visual measure which is not affected by experience or training. Experimental correlation studies of this measure and job success reveal strong relationships in instances where other visual skills had no significant effect. A relationship between

school achievement scores and the A.C.A. ratio is also demonstrated.

Paul W. Miles.

Gunderson, Trygve. **Glaucoma and amblyopia ex anopsia, two preventable forms.** J.A.M.A. **156**:933-935, Nov. 6, 1954.

It is estimated that 2 percent of the population suffers from undiscovered glaucoma. At least 20,000 persons or 15 percent of the blind population are blind from bilateral glaucoma and an additional 150,000 persons are blind from glaucoma in one eye. It is estimated that there are 1,130,360 persons with unrecognized glaucoma in the United States; over 1,000,000 persons with amblyopia ex anopsia. Tonometry should be an essential part of the physical examination in every person over 30 years of age. All children should have their visual acuity tested before the age of three years. (10 references)

Irwin E. Gaynon.

Koelbing, M. H. **The treatment of intraocular tumors by Fabricius Hildanus.** Ophthalmologica **127**:288-293, April-May, 1954.

This article deals with an interesting chapter in the history of ophthalmology. The surgeon Fabricius Hildanus (1560-1634) describes in his "Opera omnia" the treatment by enucleation of one case of malignant melanoma of the uvea and of one case of retinoblastoma. (2 figures, 10 references) Peter C. Kronfeld.

Penzani, Bruno. **Clinical studies and statistics on blindness in childhood.** Ann. di ottal. e clin. ocul. **80**:189-194, April, 1954.

Blindness in children below 15 years of age was investigated statistically in the Ophthalmology Department of the University of Milan for a period of nine years. Vision of 20/400 and less was considered blindness. 234 children (156 boys, 68 girls) were blind in one eye, 18 (12 boys, 6 girls) in both.

The following causes were found in monocular blindness: trauma 77; lens changes 47; corneal changes 33 (21 chemical and thermal burns, 8 parenchymatous keratitis, 4 degenerations); retinal lesions 22 (13 gliomas, 6 detachments, 3 Coats' disease and dystrophies, 1 macular degeneration); hydrophthalmus 16; optic atrophy 11; uveal lesions 10; microphthalmus 4; anophthalmus 4. Bilateral blindness was caused by sympathetic ophthalmia, congenital cataract, hydrophthalmus, cortical blindness, and total leucoma.

Comparing his statistics with those of earlier workers, the author notes the marked reduction in the number of cases of blindness caused by an infectious process, and the increase in the number of traumatic cases. (11 references)

John J. Stern.

Silvan, Fernando. **The medico-social aspect of strabismus.** Arch. Soc. oftal. hispano-am. **14**:672-685, June, 1954.

The author stresses the social importance of strabismus, and makes a plea for the dissemination of information on the importance of early treatment of this anomaly. He advocates lectures to the laity through teachers and directors of nurseries and orphanages, and especially through the press and radio; scientific information directed to school doctors, family doctors and pediatricians; routine ocular examination of school children; a census of strabismus cases; the establishment of strabismus clinics, including facilities for orthoptic training, attached to ophthalmologic centres; and effort to secure the cooperation of regional ophthalmologists. (31 references)

Ray K. Daily.

NEWS ITEMS

Edited by Donald J. Lyle, M.D.
601 Union Trust Building, Cincinnati 2

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notices of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

Deaths

Dr. Martin Cohen, New York, New York, died October 29, 1954, aged 84 years.

Dr. Etta Charlotte Jeancon, Los Angeles, California, died October 30, 1954, aged 72 years.

Dr. Albert Conrad Snell, Rochester, New York, died December 11, 1954, aged 83 years.

Dr. James Wallace Tanner, Eau Claire, Wisconsin, died November 17, 1954, aged 61 years.

Announcements

Course on glaucoma

A course on glaucoma with particular emphasis on gonioscopy and the study of the anterior angle will be given at the Brooklyn Eye and Ear Hospital on May 16, 17, and 18, 1955. Ample opportunity for practical instruction in the use of the gonioprism will be given and material from the glaucoma clinic will be utilized.

The course will be given by Dr. Daniel Kravitz, assisted by Dr. Walter V. Moore, Dr. Mortimer A. Lasky, Dr. Harold F. Schilback, and Dr. Arthur Shainhouse. Registration is limited to six ophthalmologists only.

Application and the fee of $40.00 may be addressed to Dr. Daniel Kravitz, Brooklyn Eye and Ear Hospital, 29 Greene Avenue, Brooklyn 38, New York.

Orthoptic technicians placement service

Miss Laura B. Drye, director, American Association of Orthoptic Technicians Confidential Placement Service, Eye and Ear Hospital, 230 Lothrop Street, Pittsburgh 13, Pennsylvania will be happy to assist ophthalmologists in obtaining a suitable orthoptic technician.

Residency available

The Jewish Hospital of Brooklyn has a vacancy for a two-year residency in ophthalmology. Applicants are requested to communicate with:

Mr. Sydney C. Peimer
Assistant Director
Jewish Hospital of Brooklyn
555 Prospect Place
Brooklyn 38, New York

Basic course in orthoptics

The basic course in orthoptics for technicians, sponsored by the American Orthoptic Council, will be held in the Department of Ophthalmology, University Hospitals, Iowa City, Iowa, from June 20 through August 13, 1955. As usual, there will be didactic lectures and practical demonstrations, and there will be an outstanding faculty for this course.

For further information write:

Dr. Herman M. Burian
Department of Ophthalmology
University Hospitals
Iowa City, Iowa

Journal back copies

Copies of The American Journal of Ophthalmology, February through November, 1930, are available. For further information write to:

Dr. Raymond A. Tomassene
1144 Market Street
Wheeling, West Virginia

Gill spring congress

The Gill Memorial Eye, Ear, and Throat Hospital, Roanoke, Virginia, will hold its 28th annual spring congress on ophthalmology and otolaryngology, April 4 to 9, 1955. Among the guest speakers will be:

Dr. Henry L. Birge, Hartford, Connecticut; Dr. Paul Boeder, Southbridge, Massachusetts; Dr. William B. Clark, New Orleans; Dr. Dan M. Gordon, New York; Dr. Anderson C. Hilding, Duluth, Minnesota; Dr. Chevalier L. Jackson, Philadelphia; Dr. Bertha A. Klien, Chicago; Dr. T. G. Martens, Rochester, Minnesota; Dr. Daniel S. Miller, Boston; Maj. Gen. Daniel Ogle, Washington, D.C.; Dr. Thomas Paine, Ann Arbor; Dr. R. Townley Paton, New York; Dr. James Purnell, New York; Dr. A. D. Ruedemann, Detroit; Dr. Robert E. Ryan, Saint Louis; Dr. Richard Schneider, Ann Arbor; Dr. John Sheldon, Ann Arbor; Dr. Grant Ward, Baltimore.

Societies

Pennsylvania Academy

The following papers on ophthalmology were presented at the fifth annual midwinter clinical meeting of the Pennsylvania Academy of Ophthalmology and Otolaryngology and the Eye and Ear Hospital, Pittsburgh:

Dr. R. C. Tomarelli, "Response of sarcoid uveitis to cortisone"; Dr. R. H. Davies, "Report of investigation committee on retrolental fibroplasia"; Dr. J. F. Novak, "Vision in steel making"; Dr. M. F. McCaslin, "Diagrammatic method of demonstrating vertical muscle imbalance"; Dr. J. C. Dunbar, "Phakogenic glaucoma"; Dr. J. C. Linn, Jr., "Keratoplasty: Technique and case presentation."

Aero Medical Association

At the 26th annual meeting of the Aero Medical Association to be held at the Hotel Statler, Washington, D.C., March 21 to 23, 1955, the following papers of ophthalmic interest will be presented:

"Physiologic aspects of binocular vision: Some factors which may be hazardous to flight," Dr. Louis F. Raymond, East Orange, New Jersey; and "An introduction to dynamic visual acuity," Dr. Elek Ludvigh, Kresge Eye Institute, Detroit, Michigan.

Richmond officers

The Richmond (Virginia) Eye, Ear, Nose, and Throat Society has elected the following officers: President, Dr. Julius C. Hulcher; secretary-treasurer, Dr. Charles N. Romaine.

The society meets at the Commonwealth Club on the first Tuesday of January, March, May, and October.

Grants-in-aid

The National Council to Combat Blindness, Inc., announces it is at this time welcoming applications for its 1955-56 research awards for grants-in-aid and full-time research fellowships in the field of ophthalmology and its related sciences.

The council has added to its research program the financing of summer fellowships initiated by its Scientific Advisory Committee as a stimulus to the development of ophthalmic investigators. All applicants for fellowships, full-time or summer, are required to make their own arrangements for suitable research facilities with accredited institutions.

Applications for 1955-56 grants-in-aid and fellowships will be considered at the sixth annual meeting of the organization's Scientific Advisory Committee, to be held in May, 1955. The closing date for the receipt of completed applications is April 15th. Appropriate forms may be obtained by addressing:

Secretary,
National Council to Combat Blindness, Inc.,
30 Central Park South,
New York 19, New York

The National Council to Combat Blindness grants-in-aid and fellowship awards for the fiscal year 1954-55, as approved by its Scientific Advisory Committee, are:

Retina Foundation, Boston; Endre A. Balazs, M.D. ($4,000): Synthesis of hyaluronic acid in the vitreous body of embryos and young animals.

University Hospitals, State University of Iowa: Hermann M. Burian, M.D. ($2,000): Temporal relationships of electric responses and chronaxie of human retina (continuation).

Ohio State University, College of Veterinary Medicine: Clarence R. Cole, D.V.M. ($2,000): Ocular toxoplasmosis in domestic animals.

University of Buffalo Medical School: Angelos N. Dellaporta, M.D. ($2,000): Pathologic studies on experimental retinal detachment.

Ohio State University, Department of Optometry: Vincent J. Ellerbrock, Ph.D. ($960): Compilation of a volume on research in subnormal vision, including evaluation of all aids.

The Presbyterian Hospital Medical Center, Institute of Ophthalmology, New York: William G. Everett, M.D. ($250): Mensuration of the human eye by X ray and the relation of measurements to pathologic states (continuation).

New York Eye and Ear Infirmary: Bernard Goldberg, M.D., Ralph Levene, M.D., Gerald Kara, M.D. ($1,000): The possible role of hyperestrinism in the pathogenesis of retrolental fibroplasia (continuation).

Wills Eye Hospital, Philadelphia: Harry Green, Ph.D., Irving H. Leopold, M.D. ($3,000): Lens metabolism and cataract formation (continuation).

New York Eye and Ear Infirmary: Jerry Hart Jacobson, M.D. ($2,400): Electroretinography in retinal diseases.

University of California Medical Center, San Francisco: Samuel J. Kimura, M.D. ($1,200): Study of keratoconjunctivitis sicca and Sjøgren's syndrome.

University Hospitals, State University of Iowa: P. J. Leinfelder, M.D. ($1,500): The effect of change in pH in the aqueous on metabolism of the lens and cornea.

Government Hospital, Haifa, Israel: I. C. Michaelson, M.D. ($2,800): New vessel growth in the eye; particularly in the retina and cornea (continuation).

Kumamoto University Medical School, Japan: Yukihiko Mitsui, M.D. ($2,650): Cultivation of trachoma virus in cultivated human conjunctival epithelium by roller tube.

Ziya Gün Institute for Research in Trachoma, University of Istanbul, Turkey: F. Necdet Sezer, M.D. ($2,000): Cultivation of trachoma virus (continuation).

Institute of Ophthalmology, Columbia University: George K. Smelzer, Ph.D. ($1,200): Investigation of experimentally produced exophthalmos.

Royal College of Surgeons and the Royal Eye Hospital, London: Arnold Sorsby, M.D. ($3,000): The biochemistry of hereditary retinal lesions.

Manhattan Eye, Ear, and Throat Hospital, New York: C. C. Teng, M.D. ($2,500): Optic nerve study.

College of Physicians and Surgeons, Columbia University: Ludwig von Sallman, M.D. ($1,000): Clinical and experimental studies in the distribution of P^{32} in tumors of the eye.

Albert Einstein Medical Center, Philadelphia: Charles Weiss, M.D., Ph.D. ($200): Exhibit on "Laboratory aids in the diagnosis of infections of the eye" (bacteriologic, serologic, mycologic, virologic, and parasitologic procedures). Shown at the International Congress of Clinical Pathologists, Washington, D.C., September 6-11, 1954.

Eye and Ear Hospital, University of Pittsburgh Medical Center: Jerome J. Wolken, Ph.D. ($3,000): Photoreceptor structures.

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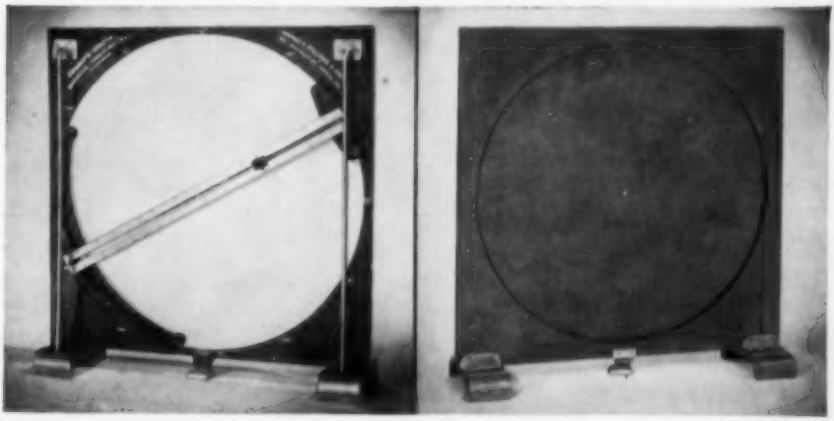


*Conover-Spaeth**

MAGNETIC CAMPIMETER

***EDMUND B. SPAETH, M.D.**

PHILADELPHIA, PA.

This new precision instrument gives *accurate* determinations and correct configuration of the visual field with great savings of time and effort.

The Conover-Spaeth Campimeter is 24" square. It is placed on a table with the patient seated in front, his eye positioned 10½" from the central fixation point. The operator, standing behind the screen, facing the patient and looking directly into the patient's eye, is able to detect the slightest wavering. The test object is introduced to the visual field from a "Concealment Circle" and is controlled by a magnet from the back of the campimeter. The patient is not able to anticipate or even guess on which radius or from which side, right or left, the test object will appear.

This assures accuracy and eliminates time-consuming rechecking.

The back of the campimeter is clearly marked in degrees of the circle and angles of vision to conform to the standard Berens chart. Each radius tested is immediately entered on the chart . . . No markers to be placed or removed.

The time saved in each examination creates opportunities for more "fields" or other office work.

√ ABSOLUTE ACCURACY

√ FAR FASTER

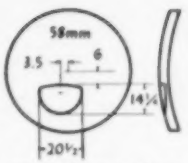
Write for detailed information.

The Full Line

AO† TILLYER *Multifocals*

true corrected curve multifocals for the full range of prescriptions

BIFOCALS



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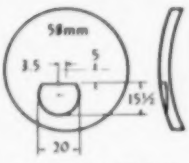

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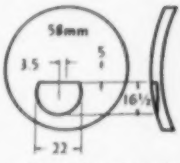

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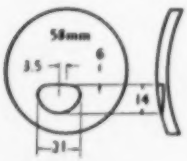
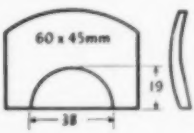


TILLYER PANOPTIK



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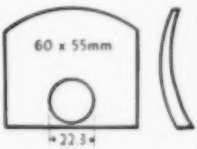

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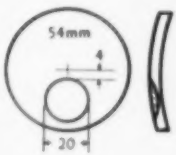

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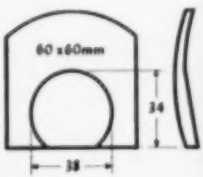
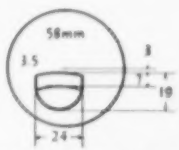
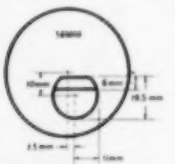


TILLYER "AA"

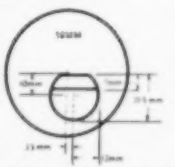
TRIFOCALS



TILLYER FUL-VUE "C"-724
50% Intermediate



TILLYER FUL-VUE "S"-622
50% Intermediate



TILLYER FUL-VUE "S"-724
50% Intermediate

TILLYER PANOPTIK
66⅔% Intermediate

TILLYER "E" ONE PIECE
Any Strength Intermediate

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